Addis Ababa University

College of Health Sciences

School of Medicine

Department of Internal Medicine

Assessment of self-reported insulin injection techniques among patients with Diabetes Mellitus on follow-up at adult Endocrine clinic at Tikur Anbessa Specialized Hospital: Hospital-based cross-sectional study September 1 - October 31, 2020 G.C.

Principal investigator - Paulos Efrem (MD, Internal Medicine Resident)

A Thesis to be submitted to the Department of Internal Medicine, School of Medicine, College of Health Sciences, Addis Ababa University, in partial fulfillment of the Specialty Certificate in Internal Medicine

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Abbreviations and Acronyms

ADA	American Diabetes Association
AOR	Adjusted Odds Ratio
BMI	Body Mass Index
CI	Confidence Interval
CVD	Cardiovascular Disease
DBP	Diastolic Blood Pressure
DM	Diabetes Mellitus
IRB	Institutional Review Board
NCD	Non-Communicable Disease
TASH	Tikur Anbessa Specialized Hospital
WHO	World Health Organization

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Abstract

Background

Assessment of injection device use and injection technique, are key components of a comprehensive diabetes medical evaluation and treatment plan. Proper insulin injection technique may lead to more effective use of this therapy and, as such, holds the potential for improved clinical outcomes. The lack of a clear number of patients with diabetes mellitus requiring insulin therapy, and few studies focused on either assessing injection techniques or associated complications separately have indicated suboptimal knowledge and skill with higher than the worldwide average on the presence of complications.

Objective

Major insulin injection parameters were assessed among patients with diabetes mellitus on follow-up at the adult diabetes referral clinic in TASH, Addis Ababa from September 1 to October 31, 2020.

Methods

A cross-sectional survey was conducted from September 1 to October 31, 2020, at the diabetes clinic in Tikur Anbessa Specialized Hospital. Data were collected by using a structured, interviewer-administered questionnaire. Then, entered and analyzed using SPSS version 20. To identify factors associated with injection techniques, bivariable and multivariable binary logistic regression analyses were done. Statistical significance was considered at a level of significance of 5%, and adjusted odds ratio (AOR) with 95% confidence interval (CI) was used to present the estimates of the strength of the association

Results

A total of 293 participants were included in this study. The most common type of diabetes reported was Type 2 diabetes mellitus. From the recommended injection sites, 256 (87.4%) inject at more than 1 site with the thigh (249/85%) being the most often used site. The median total daily insulin dose was 54IU. Insulin syringe reuse was practiced by practically all (98%) of the participants. Injection site rotation is practiced by 272 (92.8%) of the participants. The presence of any

swellings or lumps over the injection sites was reported by 113 (38.6%) of the participants with the thigh being the most common site. Disposal of used syringes capped into the trash is the practice of 176 (60.1%) of the study participants. From the multivariate analysis, sex (AOR=2.33, 95% CI:1.13-4.83), total daily dose of insulin (AOR=0.99, 95% CI:0.98-0.99), last time injection instructions were reviewed (AOR=0.35, 95% CI:0.13-0.97) and hyperglycemia events (AOR=0.56, 95% CI:0.31-0.99) showed significant association with the presence of lipohypertrophy.

Conclusion: This study revealed that there are alarmingly high rates of injection-related complications. The diabetes education given pertaining to injection parameters and evaluation of injection sites are neglected which will fuel the occurrence of complications. It highlights the need for the provision of patient-centered instruction and education about insulin injection techniques.

Keywords: diabetes mellitus, insulin, insulin injection technique, lipohypertrophy, cross-sectional study

1. Introduction

1.1 Background

The term diabetes mellitus describes a heterogeneous group of metabolic disorders characterized by defects in insulin secretion, insulin action, or both, and disturbances of carbohydrate, fat, protein metabolism, and the presence of hyperglycemia without treatment. Diabetes mellitus is found in every population in the world and all regions.[1]

The absent or near-absent beta-cell function is the hallmark of type 1 diabetes and makes insulin treatment essential for individuals with type 1 diabetes. Many patients with type 2 diabetes eventually require and benefit from insulin therapy which is important to maintain glycemic control as the disease progresses to overcomes the effect of oral agents.[2]

There are 351.7 million working-age (20–64 years) people with diagnosed or undiagnosed diabetes in 2019. By 2030GC, this number is expected to increase to 417.3 million and 486.1 million by 2045. The largest increase will take place in regions where economies are moving from low- to middle-income status. In contrast to having the lowest regional diabetes prevalence (3.9%), the number of people with diabetes in the IDF Africa Region is expected to increase by 48% by 2030 and by 143% by 2045, the highest predicted increase of all the IDF regions. [3]

Ethiopia, as one of the most populous countries in Africa, is estimated to have 1.7 million adults living with diabetes with a national prevalence of 3.2%.[3] As our country doesn't have a national diabetes registry, it is difficult to estimate the number of adult patients with type 1 diabetes as well as type 2 diabetes requiring insulin therapy[3, 4, 5]. Ensuring that patients and/or caregivers understand the correct technique of insulin injection is paramount to optimize glycemic control and insulin use safety. Therefore, insulin should be delivered into the proper tissue through the right technique. The correct technique of insulin injection includes injecting into appropriate body regions, rotating injection sites, avoidance of infection or other complications through appropriate care of injection sites, and prevention of intramuscular (IM) insulin delivery.[2]

The 2015GC worldwide injection technique questionnaire survey involving 423 centers in 42 countries reported nearly 70% of participants used shorter needle sizes smaller than 6mm, and significant associations between higher insulin dose and incorrect injection technique with injection site complications leading to higher glycated hemoglobin values and glycemic variability.[6,7]

An institution-based study done on type 1 diabetes mellitus patients with follow-up at Mekele hospital showed more than half 78 (55.3%) of the respondents had average knowledge about insulin self-administration and the majority 96 (68.0%) of the participants had a favorable attitude towards it.[8] Data from a study done in primary hospitals of northwest Ethiopia revealed that patients had moderately adequate knowledge and fair practice levels on insulin storage and handling techniques. However, patients missed important insulin administration skills.[9] The presence of local injection site complications was observed in 53% of respondents in a study done at TASH diabetes clinic attributed to incorrect injection technique.[10]

Examination of insulin injection sites for the presence of lipohypertrophy, as well as the assessment of injection device use and injection technique, are key components of a comprehensive diabetes medical evaluation and treatment plan. Proper insulin injection technique may lead to more effective use of this therapy and, as such, holds the potential for improved clinical outcomes.[11]

1.2 Statement of the problem

The burden of diabetes is increasing worldwide including in developing countries like Ethiopia. International diabetic federation association 2019 reported Ethiopia to be one of the most affected countries in Africa, with an estimated 1.7 million adults living with diabetes and a national prevalence of 3.2%.[3]

The lack of a clear number of patients with diabetes mellitus requiring insulin therapy, and few studies focused on either assessing injection techniques or associated complications separately have indicated suboptimal knowledge and skill with higher than the worldwide average on the presence of complications. [8,9,10]

1.3 Significance of the study

These observations and the unknown magnitude of this problem in our setup raised this research concern. The present study aims to assess insulin injection parameters and local complications in anticipation of gaining a complete picture of factors affecting these parameters.

This assessment of patients will help in allocating appropriate resources and identifying those at higher risk of future complications. Further care can be diverted to those in need early.

It will also provide baseline line data for the current treatment gap and act as a stepping stone for further studies in the same area.

2. Literature Review

Insulin injection techniques

According to the IDF diabetes atlas 2019, about 463 million adults between the ages of 20-79 years are estimated to be living with diabetes making up 9.3% of the global population. Among these, 19.4 million adults in the sub-Saharan region are affected by it. Ethiopia, as one of the region's most populous countries, is estimated to have 1.7 million adults living with diabetes with a national prevalence of 3.2%.[3] The WHO NCDs STEPS survey done in Ethiopia in 2015GC also showed a diabetes prevalence of 3.2%.[12]

Correct technique in insulin delivery is paramount for optimal diabetes control. Expert recommendations are provided around the themes of anatomy, physiology, pathology, psychology, and technology.[14]

A large scale study focusing on anatomy theme was conducted on Chinese insulin users in 2016GC and showed the use of the 4mm needle was able to deliver insulin into the subcutaneous tissue of nearly 100% of Chinese study participants. [13] The 4mm needle was assessed to be safe for all patient categories with no difference in insulin leakage and was even preferred by patients. [15]

Insulin delivery into the muscle or skin will alter its absorption and action leading to excessive glycemic variability. It can also lead to frequent and unexplained hypoglycemia.[16]

The needle lengths that were once recommended for SC injection (for adults, ≥8 mm) are now known to be too long because they increase the risk of IM injections without evidence of improved glucose control.[15]

The recommended injection and infusion sites are the abdomen, thigh, buttock, and upper arm.

Suggested boundaries for insulin delivery at each site are as follows.

- Abdomen: ~ 1 cm above the symphysis pubis, ~ 1 cm below the lowest rib, ~ 1 cm away from the umbilicus, and laterally at the flanks.
- Upper third anterior lateral aspect of both thighs
- Posterior lateral aspect of both upper buttocks and flanks

- Middle third posterior aspect of the upper arm.[14, 22]

Before injecting insulin, inspecting the injection sites should be done with clean hands, and if unclean should be disinfected. Disinfection is also required in institutional settings such as hospitals and nursing homes. If alcohol is used, let it dry completely before injecting.[14, 18, 19]

Injections should not be given into sites of inflammation, edema, ulceration, infection, and lipohypertrophy as well as over clothing.[20, 21]

Proper Use of syringes

Each syringe is specific for only one concentration of insulin, and any mismatch can lead to serious under-dosing or overdosing. Syringes with detachable needles should be avoided as permanently attached needle syringes deliver better dose accuracy, have far less dead space and allow the mixing of insulins if needed.[23]

When drawing up insulin, first draw air into the syringe at an equivalent dose then inject into the vial to facilitate withdrawal of insulin. Remove any air bubbles in the syringe by tapping on the barrel. Syringe needles should be used only once as they are no longer sterile after use.[21, 25] The syringe needle should not be left under the skin after the plunger is fully depressed.[24]

Several studies have shown that cloudy insulins are often inadequately resuspended. Gently roll and tip cloudy insulins (e.g. NPH and premixed insulins) until the crystals are resuspended (the solution becomes milk-white). Tipping involves one full up-down motion of the pen or vial, and rolling is a full rotation cycle between the palms. This is accomplished by rolling the insulin pen or vial in your hands at least 10 times. Visually confirm that the resuspended insulin is sufficiently mixed after each rolling and tipping, and repeat the procedure if crystal mass remains in the cartridge. Vigorous shaking should be avoided because this produces bubbles that will affect accurate dosing.[17, 24, 26, 27]

Store unopened insulin in a refrigerator in which there is no risk of freezing. After initial use, insulin should be stored at ambient temperature (15°-30°C) for up to 30 days or according to the manufacturer's recommendations and within expiration dates. If room temperatures exceed 30°C

(86°F), then insulin in current use should be stored in a refrigerator. It should be allowed to warm up before injection. Insulin can be warmed by rolling it between the palms. [17, 28, 29]

HCP & diabetes education

Despite more than 90 years of use, insulin injections and infusions are often performed incorrectly, with adverse clinical consequences for patients and additional costs for payers. Often, even simple rules are not taught or followed. The health care professional (HCP) has a crucial role in the proper use of these therapies.[30, 31]

Discuss each of the essential topics at the initiation of therapy and at least once a year thereafter. Make sure that information is delivered verbally and in writing and has been fully understood. To confirm adherence to prescriptions, ask to see the needles, insulin, and other devices from the latest batch received from the pharmacy. Assess each injection/infusion site visually and by palpation, if possible, at each visit but at a minimum once a year.[32, 33]

Local complications

Lipodystrophy is a disorder of fat tissue. There are 2 main types: lipoatrophy, which is the loss of adipocytes that clinically manifests as indenting and cratering, and lipohypertrophy (LH), which is an enlargement of adipocytes that manifests as swelling or induration of fat tissue.

The frequency of lipohypertrophy varies but studies from Spain, Italy and China showed two thirds, nearly half and over half of the enrolled patients respectively had these lesions.[34, 35, 36]

Local complications related to insulin injection were found in over half of patients in a study done in TASH in Ethiopia.[10]

Injecting into a lipohypertrophic site would alter the absorption and action of the insulin further deregulating glucose control which can manifest as unexplained hypoglycemia, glycemic variability, and elevated glycated hemoglobin.[16, 37, 38] Usually, LH regresses after stopping insulin injections into the lesions. Conversely, patients who switch from injecting into LH lesions to normal tissue are at risk for hypoglycemia unless they lower their doses.[21, 39, 40]

Needlestick Injuries/Bloodborne Infection Risk

Needles for delivering insulin are the most commonly used sharps in the world. When combined with lancet use for drawing blood, the use of medical sharps by persons with diabetes is far greater than that by any other patient population. Most sharps use is in the home setting by persons whose serostatus for hepatitis, human immunodeficiency virus, and other Bloodborne pathogens is unknown. Thus, needlestick injuries (NSIs) from diabetes sharps are an important public health issue.

A cross-sectional study from Nepal showed almost all patients disposed of the used needle improperly, and the common method was disposing of the needle in a dustbin.[41]

A similar study from Gonder in Ethiopia showed about half of the participants had poor knowledge of insulin sharps disposal.[42]

3. Objectives of the Study

3.1 General objective

- To assess the major insulin injection parameters among patients with diabetes mellitus on follow-up at adult diabetes referral clinic, TASH, Addis Ababa from September 1 to October 31, 2020.

3.2 Specific objectives

- To assess sociodemographic characteristics of patients with diabetes mellitus on follow-up at adult diabetes referral clinic, TASH, Addis Ababa from September 1 to October 31, 2020.
- To assess current insulin injection practice among patients with diabetes mellitus on follow-up at adult diabetes referral clinic, TASH, Addis Ababa from September 1 to October 31, 2020.
- To assess complications at injection sites among patients with diabetes mellitus on follow-up at adult diabetes referral clinic, TASH, Addis Ababa from September 1 to October 31, 2020.
- To assess needle stick injuries and sharps disposal among patients with diabetes mellitus on follow-up at adult diabetes referral clinic, TASH, Addis Ababa from September 1 to October 31, 2020.

4. Methods and Materials

4.1 Study setting

Addis Ababa lies 9°1 ′48″N latitude and 38 ° 44 ′24″E longitudes. The city is located at the heart of the country, at an altitude ranging from 2,100 meters at Akaki in the south to 3,000 (9,800 ft) meters at Entoto Hill in the North.

Tikur Anbessa Specialized hospital is the largest referral hospital in Ethiopia with 1025 beds. It is an institution where specialized clinical services are rendered to the whole nation. It is also the main teaching hospital for the College of Health Sciences at Addis Ababa University. Its diabetes clinic, led by Endocrinologists, provides services for patients with diabetes on two working days per week with an average of 70 to 80 cases attending during the clinic days. The hospital launched a digital record system in 2018GC where the clinical data and other pertinent profiles of the patients are stored and retrieved as needed.

The study was conducted from September 1 to October 31, 2020GC.

4.2 Study design

An institution-based cross-sectional study design was used for this study incorporating data from a questionnaire tool.

4.4 Source and study population

The source of the population comprises all insulin-requiring patients with type 1 and type 2 diabetes mellitus who visited the diabetes clinic of TASH from September 1 to October 31, 2020, for control of blood sugar and medication refill.

The study population is consecutive eligible and consenting participants attending the diabetes clinic in TASH during the study period.

4.5 Eligibility criteria

4.5.1 Inclusion criteria

All insulin-requiring patients with type 1 and type 2 diabetes mellitus attending TASH diabetes clinic during the study period with age ≥18 years who have injected insulin for at least 6 months and give verbal consent for interview.

4.5.2 Exclusion criteria

- Incomplete medical records.
- Non-volunteers or seriously ill for interview.
- Pregnant mothers.

4.6 Sample Size Determination

The least sample size (n) required for the study was calculated using the formula to estimate a single population proportion.

$$n = \frac{Z_{\frac{\alpha}{2}}^{2} P (1 - P)}{d^{2}}$$

Where;

n = required sample size

$Z_{\alpha/2}$ = critical value for normal distribution at 95% confidence interval= 1.96 ($\alpha = 0.05$).

P = Proportion = 50%

d = margin of error= 5%

So, $n = \frac{(1.96)^2 * (0.5)(1-0.5)}{(0.05)^2} = 384$,

Taking 10% non-responders rate, the total sample size was 400.

As the estimated source population during the study period was less than 10,000, we used it to recalculate the sample size. At the highest point of the COVID-19 outbreak, the average number of patients with diabetes seen at the referral clinic dropped by 50%, dropping from almost 100 patients per clinic day to 50 patients as can be seen on the patient register found in the clinic. The clinic functions with 2 days per week allotted to patients with diabetes. Considering the above information, the estimated source population during the 2 months (8 weeks) study period adds up to be 800 patients. The recalculated sample size was estimated using the reduction formula below.

$N1 = \frac{n}{(1 + n/N)}$, n: Initial sample size (400)

N: Estimated source population during the study period (800)

N1= 267

4.7 Sampling techniques and sampling procedure

To eliminate selection bias, subjects were recruited into the study on a sequential basis, i.e., consecutive eligible and consenting participants entering the clinic were enrolled.

4.8 Study variables

4.8.1 Outcome variables

- The presence of local complications (lipohypertrophy)

4.8.2 Explanatory variables

- Sociodemographic variables: age, sex, educational status, marital status, occupation, household income, and residence.

- Injection technique: length of needle, injecting into LH, leakage from the injection site, and failing to reconstitute cloudy insulin, injection site rotation, needle reuse, routine injection site inspection, injection instructions & training, sharps disposal, frequent hyperglycemia, severe hypoglycemia
- Clinical and laboratory measures: duration of diabetes, total daily insulin dose, BMI and HbA1C.

4.9 Data collection techniques

Data were collected from volunteer patients using a structured questionnaire. Data on clinical and laboratory profiles of the participants was obtained through a review of electronic medical records. A structured questionnaire was prepared in English and translated into Amharic. Finally, it was translated back to English to check its consistency. Data were collected by trained diabetes nurses.

4.10 Data quality and management

To ensure the quality of data, training was given to data collectors on-site for one day before the survey to ensure consistency and reduce Intra and inter observation differences on the measurement of variables.

4.11 Data processing and analysis

After data collection by structured questionnaire, each completed form was checked for completeness and was entered into SPSS 20 for analysis.

Descriptive statistics included mean with SD and median with IQR for continuous variables, while frequency and percentage tables were used for categorical data.

Simple cross-tabulation and binary logistic regression analysis were used to study the association of independent variables with the presence of local injection site complications. Model fitness was checked using the Hosmer-Lemeshow goodness-of-fit test and was found to be fit. First, the bivariable analysis was done to identify the variables associated with the knowledge of the therapeutic goals of diabetes management. Then variables with P-value <0.25 in the bivariable analysis were selected as candidate variables and entered together to multivariable analysis to

control for confounders. Lastly, variables with a p-value <0.05 in multivariable analysis were considered as statistically significant and AOR with 95% CI was estimated to measure the strength of the associations. The result was presented by using text and tables.

4.12 Operational definitions

- Local complications: the presence of lipohypertrophy or lipoatrophy reported by the patient.

4.13 Ethical Considerations

The study was done in conformity with the ethical guidelines. The purposes and importance of the study were explained and informed verbal consent was obtained from each study participant. Confidentiality was maintained at all levels of the study. Participants who reported local complications and requested further education regarding injection techniques were linked to their care provider to obtain the needed care.

All study participants were informed that participation in this research project would have no incentives nor direct benefit. Participants who were unwilling to participate in the study and those who wish to quit their participation at any stage were informed to do so without any restriction.

4.14 Plan for dissemination of research finding

The finding of this study will be submitted to the Department of Internal Medicine, College of Health Sciences, and Addis Ababa University. It will also be shared with the Ethiopian Diabetes Association.

5. Results

5.1 Demographic characteristics of the respondents

A total of 293 participants were involved in the study adding up to a response rate of 73.25% considering the initial sample size but after recalculating using the reduction formula, the response rate exceeded the estimated sample size of 267 participants. The median (IQR) age for the participants was 47 (30 - 58) years and two-thirds (194/66.2%) were females. Only 20 (6.8%) participants had no formal education. Of the total, 185 (63%) of the participants were married. Among them, 117 (40%) were employed. Nearly 39% of patients had type 1 diabetes mellitus and 61% had type 2 diabetes mellitus. A larger proportion of participants 120 (44%) had a normal BMI with 94 (34.4%) of the total being overweight.

The median (IQR) duration from diabetes diagnosis was 13 (8 - 20) years. The glycated hemoglobin median (IQR) value was 9% (7.7 - 10.6%) and the median (IQR) total daily insulin dose was 54 (34 - 70) IU.

Table 1: Sociodemographic characteristics of patients with diabetes mellitus at adult diabetes referral clinic, TASH, September 1 – October 31, 2020.

Characteristics		Count (n=293)	Percent (%)
Sex	Male	99	33.8
	Female	194	66.2
Age	18-24 Years	27	9.2
	25-34 Years	60	20.5
	35-44 Years	47	16
	45-54 Years	54	18.4
	55-64 Years	68	23.2
	>/= 65 Years	37	12.6
Residence	Urban	280	95.6
	Rural	13	4.4
Marital status	Single	74	25.3
	Married	185	63.1
	Divorced	12	4.1
	Widowed	22	7.5
Level of education	No formal education	20	6.8
	Primary education	77	26.3

	Secondary education	98	33.4
	Higher education	97	33.1
Occupation	Government employee	40	13.7
	Self-employed	77	26.3
	Housewife	92	31.4
	Pensioner	43	14.7
	Others	41	14
Diabetes type	Type 1	113	38.6
	Type 2	180	61.4
Body Mass Index (n=273)	Underweight	12	4.4
	Normal	120	44
	Overweight	94	34.4
	Obese	47	17.2

5.2 Clinical characteristics of the respondents

Overall, 168 (57.3%) of participants took insulin only and 125 (42.7%) took insulin in combination with oral agents. NPH insulin alone was used by more than three fourth (228/78.1%) of the study participants. All the participants used an insulin syringe only for injections. The 5mm syringe was used by 154 (52.6%) of the participants and the 10mm syringe was used by approximately 87 (30%). Twice daily injections were practiced by 276 (94.2%) of the participants.

Table 2: Clinical profiles of patients with diabetes mellitus at adult diabetes referral clinic, TASH, September 1 – October 31, 2020.

Characteristics		Count (n=293)	Percent (%)
Medications (n=293)	Insulin	168	57.3
	Insulin & oral agents	125	42.7
Insulin types (n=292)	NPH	228	78.1
	NPH & RI	59	20.2
	Mixtard	5	1.7
Injection Device	Syringe	293	100
Number of Daily injections (n=293)	1	11	3.8
	2	276	94.2
	3	6	2
Needle length (n=293)	12mm	1	0.3
	10mm	87	29.7
	8mm	5	1.7
	6mm	29	9.9
	5mm	154	52.6
	4.5mm	3	1
	Don't know	14	4.8

From the recommended injection sites, 256 (87.4%) inject at more than 1 site with the thigh (249/85%) being the most often used site.

Table 3: Injection sites used by patients with diabetes mellitus at adult diabetes referral clinic, TASH, September 1 – October 31, 2020.

Characteristics		Count (n=293)	Percent (%)
Injection sites	Abdomen alone	20	6.8
	Thigh alone	8	2.7
	Arm alone	9	3.1
	Abdomen/arm	15	5.1
	Abdomen/thigh	81	27.6
	Thigh/arm	33	11.3
	Abdomen/thigh/arm	123	42
	Abdomen/thigh/buttock	2	0.7
	All 4 sites	2	0.7

Insulin syringe reuse was practiced by 282 (98%) of the study participants with three-fourths (213/77%) reusing 5 times or less. The major reason for needle reuse among the participants was the unavailability of syringes (141/50%).

Table 4. Insulin syringe use among patients with diabetes mellitus at adult diabetes referral clinic, TASH, September 1 – October 31, 2020.

Characteristics		Count (n=293)	Percent (%)
Reuse needles (n=288)	Yes	282	97.9
	No	6	2.1
Frequency of reuse (n=277)	2 times	27	9.7
	3-5 times	186	67.1
	6-10 times	48	17.3
	>10 times	16	5.8

Occasional high blood glucose readings occurring less than 4 times per month were seen among 77 (48.4%) of the participants and severe (level 3) hypoglycemia was scarcely evident as 133 (78.2%) didn't have any events.

Table 5. Glycemic variability among patients with diabetes mellitus at adult diabetes referral clinic, TASH, September 1 – October 31, 2020.

Characteristics		Count (n=293)	Percent (%)
Frequent hyperglycemia (n=159)	>5 high readings per week	16	10.1
	3-5 high readings per week	29	18.2
	1-2 high readings per week	37	23.3
	<4 times per month	77	48.4
Severe hypoglycemia (n=170)	>5 times in 6 months	2	1.2
	3-5 times in 6 months	5	2.9
	1-2 times in 6 months	30	17.6
	None	133	78.2

A significant number (244/83.8%) of participants reconstitute cloudy insulin (NPH or mixtard) before use. Before opening the vials, 253 (86.3%) participants store them in a refrigerator and 180 (61.4%) of the participants continue to do so afterward. Subsequently, during the use of the refrigerated insulin, only 149 (56%) of the participants let it warm up to room temperature before injecting it. Regarding cleaning of the injection site, 118 (40.3%) participants use alcohol swabs whereas 75 (25.6%) clean the insulin vial cap with alcohol swabs.

Injection site rotation is practiced by 272 (92.8%) of the participants. Self-measurement of blood glucose was being done upwards of 1-2 times per day by 103 (36.3%) of the participants.

Approximately one-third (105/35.8%) of the participants have skipped injections and the major reasons were forgetting (18.1%), the glucose being too low (16%), and not eating (15%). Virtually all patients (279/95.2%) did not practice injecting through their clothes.

The presence of any swellings or lumps over the injection sites was reported by 113 (38.6%) of the participants with the thigh being the most common site. Approximately 10% of these patients still inject into these swellings citing that it's a habit. Painful injections were present in 153 (52.2%) of the participants and injection site bleeding/bruising was appreciated by 131 (44.7%). Insulin leakage from injection sites were present in 53 (18.1%) and leakage from the needle tip in 30 (10.3%) of the participants.

Disposal of used syringes capped into the trash is the practice of 176 (60.1%) of the study participants. The use of a homemade or a sharps disposal container is the way 60 (20.5%) of the participants dispose of their used sharps but the container is still thrown into the trash when full.

Nearly 4.8% of patients reported that there were people in their immediate surroundings who might accidentally get stuck with sharps with children being the most vulnerable to sustain the injury. When asked whether any sharps injury had already occurred, only 2 participants said yes and stated the lack of appropriate sharps disposal containers to be the reason behind it.

In the 6 months prior to the survey, 37 (12.6%) participants experienced severe hypoglycemia, 160 (55%) participants experienced hyperglycemia and 29 (9.9%) participants were hospitalized due to high blood sugar levels.

Diabetes education regarding injection parameters was given to the majority of the participants by general nurses (130/44.4%) and diabetes nurses (109/37.2%). Injection site examination for two-thirds (195/66.6%) of the participants were not done during their follow-up as they could not recall being examined. For nearly 183 (63%) of the participants, the last time they received or reviewed injection instructions was more than 1 year ago.

5.3 Factors associated with the presence of lipohypertrophy

From the bivariate analysis 11 variables: sex, occupation, BMI, duration of diabetes, the total daily dose of insulin, length of insulin needle, rotation of injection sites, last injection site examination, last time injection instructions were reviewed, hyperglycemia events, and most often used injection sites were associated with the presence of lipohypertrophy at P-value of <0.25 and entered into multivariate analysis.

From the multivariate analysis, sex (AOR=2.33, 95% CI:1.13-4.83), total daily dose of insulin (AOR=0.99, 95% CI:0.98-0.99), last time injection instructions were reviewed (AOR=0.35, 95% CI:0.13-0.97) and hyperglycemia events (AOR=0.56, 95% CI:0.31-0.99) showed significant association with the presence of lipohypertrophy. Male participants showed a 133% increased odds of having lipohypertrophy; for each one IU increase in the total daily dose of insulin, the odds of having lipohypertrophy decreases by 1%; compared to never receiving injection instructions, receiving them in the previous 6 months reduced the odds of having lipohypertrophy by 65%; and the more the hyperglycemia episodes, the odds of having lipohypertrophy declined by 44%.

Table 6. Bivariable and multivariable binary logistic regression analysis results of factors associated with the presence of lipohypertrophy among patients with diabetes mellitus at adult diabetes referral clinic, TASH, September 1 – October 31, 2020.

Variables		Lipohypertrophy		COR (95% CI)	AOR (95% CI)
		Present	Absent		
Sex	Male	33 (29.2%)	66 (36.7%)	1.40 (0.85-2.33)	2.33 (1.12-4.72)¥
	Female	80 (70.8%)	114 (63.3%)	1	1
Total daily insulin dose (IU)		58 (44 - 76)*	50 (32 - 67.25) *	0.99 (0.98-0.99)	0.99 (0.98-0.99)¥
Last Injection instructions	Within the past 6 months	19 (16.8%)	17 (9.4%)	0.41 (0.17-0.98)	0.35 (0.13-0.97)¥
	Within the past 6-12 months	28 (24.8%)	45 (25%)	0.74 (0.35-1.56)	0.71 (0.30-1.67)
	Within the last 1-5 years	29 (25.7%)	46 (25.6%)	0.73 (0.35-1.53)	0.70 (0.29-1.67)
	Within the last 5-10 years	20 (17.7%)	34 (18.9%)	0.79 (0.35-1.73)	1.32 (0.51-3.44)
	Never	17 (15%)	37 (20.6%)	1	1
Hyperglycemia episodes	Yes	72 (63.7%)	88 (48.9%)	0.54 (0.33-0.87)	0.56 (0.31-0.99)¥
	No	40 (35.4%)	91 (50.6%)	1	1

¥ Statistically significant at P-value ≤0.05, * median (IQR)

6. Discussion

The current study assessed insulin injection techniques and complications among 293 patients with diabetes mellitus who have a follow-up at TASH adult Endocrine referral clinic.

The median (IQR) age of the participants was 47 (30 - 58) years, which appears to be slightly younger compared to similar studies done in the TASH adult diabetes referral clinic. and can be explained by the proportion of type 1 DM patients in this study, as they tend to be much younger than their type 2 DM counterparts.[9, 42]

The number of female patients who participated in the study was 194 (66.2%). This was comparable to studies done in a Nepali Tertiary Hospital and at Tikur Anbessa Specialized Hospital, where more than half of the patients were females.[41, 43] While the reverse was seen from cross-sectional studies done in Indian and Gonder Hospitals, where the majority were males.[9, 11]

The most common type of diabetes seen is Type 2 diabetes mellitus (61.4%). This was comparable to other studies done in the TASH diabetes clinic.[43, 44] But comparing the patients with type 1 DM with similar studies in India, Nepal, China and Ethiopia revealed a higher proportion of this subgroup in this study.[8, 11, 41, 43, 45, 46]

Nearly half (44%) of the patients had a normal BMI, the median (IQR) total daily insulin dose was 54 (34 - 70) IU and the median (IQR) glycated hemoglobin value was 9% (7.7 - 10.6%). Although not far from a multicenter worldwide study result, the total daily insulin dose and the glycated hemoglobin were slightly elevated.[6]. All participants used insulin syringes with more than half injecting with a 5mm needle they received from the TASH diabetes clinic pharmacy, which diverges from data elsewhere reporting longer needle usage.[6] From the recommended injection sites, 256 (87.4%) inject at more than 1 site with the thigh (249/85%) being the most often used site similar to an insulin injection technique study done in India.[11] The median (IQR) duration from diabetes diagnosis was 13 (8 - 20) years comparable to studies from Tikur Anbessa Specialized Hospital.[43, 44]

Twice daily injections were practiced by 276 (94.2%) of the participants. Insulin syringe reuse was practiced by practically all (98%) of the participants which were comparable to data from a cross-sectional study on adherence to insulin administration done at Tikur Anbessa Specialized

Hospital.[44] Injection site rotation was practiced by 272 (92.8%) of the participants while 60.75% practiced it in a study done in primary hospitals in northwest Ethiopia.[9] The presence of any swellings or lumps over the injection sites was reported by 113 (38.6%) of the participants with the thigh being the most common site, which is higher than the worldwide average of 29% but lower when compared to the complications reported by almost half of the patients in a Saudi study.[7, 47] The most common site to develop lipohypertrophy is the thigh as it is the most often used injection site. Disposal of used syringes capped into the trash is the practice of 176 (60.1%) of the study participants.

When compared with the worldwide injection technique questionnaire survey, the age of respondents, the BMI, years with DM, total daily insulin dose, glycated hemoglobin, and disposal of sharps were similar. [6, 7]

The worldwide injection technique questionnaire survey, in contrast to this study, showed the most common injection site was the abdomen, the most commonly used needle length was 8mm, the commonest number of injections per day was 4, needle reuse was about 70%, most frequent reason for reuse was convenience and risk of needle stick injury was higher.[6, 7]

From the multivariate analysis, apart from the male sex, the total daily dose of insulin, last time injection instructions were reviewed and hyperglycemia events showed a significant but negative association with the presence of lipohypertrophy. On the other hand, the worldwide injection technique questionnaire survey found higher consumption of insulin, higher glycated hemoglobin values, increased frequency of unexpected hypoglycemia and glucose variability as well as more frequent diabetic ketoacidosis, incorrect rotation of injection sites, use of smaller injection zones, longer duration of insulin use, and reuse of pen needles to be positively associated with the presence of lipohypertrophy. Both studies have found that patients were less likely to have injection site lipohypertrophy, if they received injection instructions from their HCP in the past 6 months as they would rotate injection sites correctly.[6,7]

The previous studies assessing insulin injection techniques and related local complications worldwide and in Ethiopia have shown gaps in management involving inadequate diabetes education similar to this study, leading up to incorrect insulin injection techniques and subsequent development of complications.

7. Strength and Limitation of the study

The use of a relatively large sample size, exhaustive inclusion of potential confounders in the model, and the use of a standardized questionnaire to obtain quality data are among the strengths of this study. In contrast, as it was mainly a quantitative cross-sectional study, it cannot assess other possible factors of poor insulin injection technique than those mentioned in literature. Furthermore, the study area was only a single center leading to possible difficulty generalizing findings.

8. Conclusions

In this study, the presence of any swellings or lumps over the injection sites was reported by 113 (38.6%) of the participants, with the thigh being the most common site, indicating the incorrect insulin injection techniques practiced by the participants. Independent determinants of the presence of lipohypertrophy were identified as sex, the total daily dose of insulin, last time injection instructions were reviewed and hyperglycemia events. Diabetes education pertaining to injection parameters and evaluation of injection sites are neglected which will fuel the occurrence of complications. Planning interventional strategies targeting the aforementioned modifiable determinants may help to improve injection techniques on top of patient focused diabetes education.

9. Recommendations

Based on the findings of this study, the following recommendations are forwarded to the respective bodies:

Diabetic patients:

- People with diabetes who inject insulin should apply what they have learned about insulin injection techniques.

Diabetes association:

- We would like to recommend the diabetes association and other concerned bodies to work on teaching insulin injection parameters and supporting the economically underprivileged patients.

Clinicians:

- Physicians should prioritize assessing injection sites and further encouraging diabetes education.

Government higher officials:

- Governmental higher officials are also recommended to take intervention measures to improve access to diabetes education and resources like short-length syringes to prevent incorrect injection techniques.

Researchers:

- Researchers are recommended to conduct larger multicenter prospective studies to identify other possible causes and plan interventions accordingly.

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11. Annexes

Annex 1: Declaration

I, the undersigned, declare that this postgraduate thesis is my original work, has not been presented for a degree in this or any other university and that all sources of material used for the thesis have been duly acknowledged.

Postgraduate Candidate: Paulos Efrem (MD, Internal Medicine Resident)

Signature: …….

Date of Submission: December 29, 2020

This thesis has been submitted with my approval as advisor.

Advisor: Getahun Tarekegn (MD, Internist, Endocrinologist)

Signature: …….

Date: …….

Place: Addis Ababa, Ethiopia

Annex 2: Questionnaire for patients with diabetes who inject insulin

Code _____

This questionnaire is voluntary and completely anonymous. If you choose not to participate your treatment will not be affected in any way. Persons who have injected insulin for at least 6 months are invited to participate. The information you provide will be used to improve training and education for all people giving injections to manage their diabetes.

I-care number _____ Date of interview _____

Section 1: Baseline Characteristics

1. Age? _____years
2. Gender?
    a. Male
    b. Female
3. Residence?
    a. Urban
    b. Rural
4. Current marital status?
    a. Single
    b. Married
    c. Divorced
    d. Widowed
5. What is your level of education?
    a. No formal education
    b. Primary school
    c. Secondary school
    d. Higher education
6. What is the occupation you practiced as, over the past 12 months?
    a. Government employee
    b. Self-employed
    c. House wife
    d. Farmer
    e. Pensioner
7. What is your average household monthly income? _____Birr
8. Weight _____Kg
9. Height _____m
10. Recent hemoglobin A1C _____%

Section 2: Injection Techniques

11. What type of diabetes do you have?
    a. Type 1 DM
    b. Type 2 DM
    c. Gestational DM
    d. Other _____
12. How long have you had diabetes?
    a. > 6 months but <1 year - indicate number of months: _____ months
    b. ≥1 year - indicate number of years: ____ year(s)
13. How old were you when you were diagnosed with diabetes? _____years
14. What type of treatment are you currently taking for your diabetes? Choose all that apply
    a. Pills (_____years)
    b. Insulin (_____years)
    c. GLP-1 receptor agonist (_____years)
15. If on insulin, what is your total daily dose? _____IU
16. Which device do you normally use to inject? Choose all that apply
    a. Syringe
    b. Pen
    c. Other (e.g. insulin pump)
17. How many injections do you give per day?
    a. 1
    b. 2
    c. 3
    d. 4
    e. 5
    f. 6
    g. 7
    h. More than 7
18. What length of needle do you currently use to inject? Choose all that apply
    a. 12.7 mm
    b. 12 mm
    c. 10 mm
    d. 8 mm
    e. 6 mm
    f. 5 mm
    g. 4.5 mm
    h. 4mm
    i. Don't know
19. Has the length of your needle been changed since you started injecting?
    a. Yes

b. No

20. If yes, do you know why the length has changed? Choose all that apply
    a. To make injections more comfortable
    b. To reduce risk of going into muscle
    c. To reduce the risk of hypoglycemia
    d. Don't know
21. What injection sites do you use? Choose all that apply
    a. Abdomen
    b. Thigh
    c. Buttocks
    d. Arm
22. If you use more than one site rank them 1 to 4 according to frequency used: Most often = 1 and Second most often = 2, unused will be blank, etc.?
    _____Abdomen
    _____Thigh
    _____Buttocks
    _____Arm
23. How do you choose where to inject?
    a. I always inject in the same site at the same time of day (e.g. morning injection always in the abdomen)
    b. I inject in the same site for a whole day
    c. I inject in the same site for a few days
    d. I choose the site according to my physical activity
    e. I choose the site according to my rotation schedule (or plan)
    f. I have no specific injection routine regarding injection site
    g. I choose the site that hurts the least
24. In question 21, you specified the injection sites you use. From the boxes below, choose the one that most closely represents the size of the area described:

	Envelop size	Playing card size	Credit card size	Stamp size
Abdomen				
Thigh				
Buttocks				
Arm				


K
K


Oromia International Bank
CARD
1234 5678 9876 5432
4567
12/14
Card holder name
ethioPay


ETHIOPIA
55¢

25. Do you rotate injection sites?
    a. Yes
    b. No, skip to question 27
26. If yes, how would you describe this rotation? Choose all that apply
    a. I move back and forth from right side of my body to left
    b. I move from one injection site to another
    c. I inject about a finger's breadth (1 cm) from where I previously injected
    d. My injections describe a circle around my injection sites
    e. My injections describe lines across my injection sites.
27. Do you have any swelling or lumps under the skin at your usual injection sites that have been there for some time (weeks, months or years)?
    a. Yes
    b. No, skip to question 31
28. If yes, at which site(s)? Choose all that apply
    a. Abdomen
    b. Thigh
    c. Buttocks
    d. Arm
29. Do you inject into these swellings or lumps?
    a. Yes
    b. No, skip to question 31
30. If yes, please indicate why you inject into them? Choose all that apply
    a. It's convenient
    b. It's less painful
    c. Just a habit (I always inject there)
    d. Don't know
31. Before the injection do you clean the skin with disinfectant (e.g. an alcohol swab)?
    a. Yes
    b. No
32. Before inserting the needle into the vial or attaching a pen needle to the pen, do you clean the stopper with disinfectant (e.g. an alcohol swab)?
    a. Yes
    b. No
33. If you use an insulin filled pen, how long do you leave the needle under the skin after you have pushed the plunger in?
    a. < 5 sec
    b. 5 – 10 sec
    c. > 10 sec
    d. I'm not aware of how long
34. If you use a pen, do you use your pen needle more than one time?

a. Yes
b. No

35. If Yes, how many times do you use a single pen needle?
    a. 2 times
    b. 3 to 5 times
    c. 6 to 10 times
    d. More than 10 times
36. If you use the pen needle more than 1 time, why do you do it (choose all appropriate answers)?
    a. Because you did not have another pen needle available
    b. To save money
    c. To prevent excess waste (environmental concern)
    d. For convenience
37. If you use a syringe, do you inject with it more than one time?
    a. Yes
    b. No, skip to question 40
38. If Yes, how many times do you use a single syringe?
    a. 2 times
    b. 3 to 5 times
    c. 6 to 10 times
    d. More than 10 times
39. If you use the syringe more than 1 time, why do you do it (choose all appropriate answers)?
    a. Because you did not have another syringe available
    b. To save money
    c. To prevent excess waste (environmental concern)
    d. For convenience
40. Are your injections ever painful?
    a. Yes
    b. No, skip to question 43
41. If yes, how would you best describe your injections?
    a. Always painful
    b. Often painful (several times a week)
    c. Sometimes painful (several times a month)
    d. Almost never painful (several times a year)
42. When you have a painful injection, what do you attribute it to? (choose all that may be appropriate)
    a. The injection site (e.g. I hit a nerve)
    b. The amount or volume injected
    c. I've already used the needle before
    d. My injection technique wasn't right

e. The temperature of drug injected
f. I don't know

43. Do your injection sites ever bleed or look bruised?
    a. Yes
    b. No, skip to question 45
44. If yes, how often does the injection cause bleeding or bruising?
    a. Always
    b. Often (several times a week)
    c. Sometimes (several times a month)
    d. Almost never (several times a year)
45. Does insulin ever leak out of your injection site on the skin?
    a. Yes
    b. No, skip to question 47
46. If yes, how often does fluid leak out of the skin from the injection site?
    a. Always
    b. Often (several times a week)
    c. Sometimes (several times a month)
    d. Almost never (several times a year)
47. Is there any dribble/leakage of insulin from your needle tip after injection?
    a. Yes
    b. No, skip to question 49
48. If Yes, how often do you see such leakage from the needle?
    a. Every time I inject
    b. Often (several times a week)
    c. Sometimes (several times a month)
    d. Almost never (several times a year)
49. Do you ever inject through your clothing?
    a. Yes
    b. No, skip to question 51
50. If yes, how frequently do you inject through clothing?
    a. Always
    b. Often (several times a week)
    c. Sometimes (several times a month)
    d. Almost never (several times a year)
51. If you use cloudy insulin (NPH or pre-mixed insulin), do you re-mix your insulin prior to use?
    a. Yes
    b. No, skip to question 53
52. If yes, before injecting how many times on average do you roll and/or tip the pen or insulin vial_____ times

53. Where do you store your insulin before you begin to use the pen or vial?
    a. Refrigerator
    b. Bathroom, purse, drawer or other – room temperature

54. Where do you store your insulin after you begin to use the pen or vial?
    a. Refrigerator
    b. Bathroom, purse, drawer or other – room temperature
55. If you keep the insulin that you are using in the refrigerator, do you allow it to warm up to room temperature before injecting it?
    a. Yes
    b. No
56. Do you ever use your insulin vial or cartridge after their expiry date?
    a. Yes
    b. No
    c. I don't usually keep track of expiry dates on my insulin
57. How do you dispose of your used pen needles/syringes?
    a. Into a container specially made for used sharps
    b. Into a home container such as an empty bottle
    c. Into the rubbish with the cap on
    d. Into the rubbish without recapping
    e. I clip off the needle and it stays in the clipper
58. If you dispose into a container, what do you do with the container?
    a. Put it into the rubbish
    b. Take it to the hospital or clinic
    c. Take it to a local deposit or collection service
    d. None of the above
59. Do you ever miss or skip an injection?
    a. Yes
    b. No, skip to question 62
60. If yes, how often does this happen?
    a. Often (several times a week)
    b. Sometimes (several times a month)
    c. Almost never (several times a year)
61. What is/are the usual reason(s) for skipping an injection? (tick all that apply)
    a. I forgot
    b. I didn't eat
    c. I was sick (e.g. nausea and vomiting)
    d. I just didn't want to inject
    e. My glucose was too low
62. Who taught you how to give your injections?

a. General Nurse
b. Diabetes Nurse
c. Diabetes Educator
d. Doctor (General Practitioner)
e. Doctor (Diabetes Specialist)
f. Pharmacist
g. A representative of the pen or needle manufacturer

63. How often does the nurse or doctor examine your injection sites?
    a. Routinely every visit. Specify how often this is: every_____months
    b. Once a year
    c. Only if I complain of a problem at a site
    d. I can't remember my sites ever being checked
64. Choose YES if the subject was covered when you were taught about injecting or at any time since? Choose the last column if you feel you need more training on the subject?

No.	Subject	Yes	Still need more training
1	Injection sites (e.g. thigh, arm, buttock, abdomen)		
2	Skin thickness and appropriate depth of injection		
3	Length of needle		
4	How to do a skin lift or "pinch up" the skin		
5	How long to hold a skin lift or "pinch up"		
6	Angle of needle entry		
7	How long to keep the needle in the skin after injection		
8	Rotating within an injection site		
9	Prevention of air bubbles (syringe) or proper priming of pen needle		
10	Mixing insulin in a syringe (for syringe users)		
11	Re-suspension of cloudy insulin		
12	Single use of pen needle/syringe		
13	Safe disposal of sharps (pen needles, syringes)		

65. When was the last time you received or reviewed instructions on injections?
    a. Within the past 6 months
    b. Within the past 6-12 months
    c. Sometime in the last 1 to 5 years
    d. Sometime in the last 5 to 10 years
    e. Never
66. In the last six months have you experienced hypoglycemia (low blood sugar)?
    a. Yes

b. No, skip to question 69

67. If yes, how many times in the last six months have you had hypoglycemia so severe you needed assistance from another person?
    a. None
    b. 1 to 2 times
    c. 3 to 5 time
    d. More than 5 times
68. Did you require an ambulance or a visit to the hospital/clinic during any of these hypoglycemic episodes?
    a. Yes
    b. No
69. How often do you do finger-pricks to check your blood glucose?
    a. More than 4 times a day
    b. 3 to 4 times a day
    c. 1 to 2 times a day
    d. Several times a week
    e. I rarely or never check blood glucose
70. Have you ever had to be admitted to a hospital, emergency unit or clinic because of diabetes ketoacidosis (DKA or diabetic coma)?
    a. Yes
    b. No, skip to question 72
71. If yes, please indicate the timing of the DKA admissions?
    a. I've had DKA but only when I was first diagnosed with diabetes
    b. I've had DKA but not within the last six months
    c. I've had DKA including within the last six months
72. Do you have frequent hyperglycemia (blood glucose values more than 250 mg/dL?
    a. Yes
    b. No, skip to question 74
73. If yes, please indicate the frequency of the hyperglycemia?
    a. More than 5 high readings/week
    b. 3 to 5 high readings/week
    c. 1 or 2 high readings/week
    d. An occasional high reading (less than 4 times/month)
74. Are there any persons in your immediate surroundings who might accidentally get stuck with one of your used sharps (needle or lancet)?
    a. Yes
    b. No, proceed to the end.
75. If yes, please identify the at-risk persons? (choose as many as appropriate)
    a. Children
    b. Other family members (e.g. spouse)

c. Nurse or other professional
d. House keeper or rubbish collector

76. Have any of these persons ever had an accidental injury with one of your diabetes sharps?
    a. Yes
    b. No
77. Please indicate why these persons may be at-risk? (choose as many as appropriate)
    a. I don't use devices that prevent injuries to others (safety devices)
    b. I don't have appropriate disposal containers for my used sharps
    c. Used sharps are sometimes left in places where others might get stuck
    d. I'm positive for hepatitis or another blood-borne illness

Thank you for your time.

Annex 3: ኢንሱሊን ለሚወጉ የስኳር ህመምተኞች መጠይቅ

ኮድ _____

ይህ መጠይቅ በፍቃደኝነት የሚሞላ እና የታካሚዉን ምስጢራዊነት የሚጠብቅ ነው። ላለመሳተፍ ከመረጡ በሕክምና እና በክትትልዎ ላይ ምንም ተጽእኖ አያመጣም። ኢንሱሊን ቢያንስ ለ 6 ወራት የወሰዱ ታካሚዎች እንዲሳተፉ ተጋብዘዋል፡ ፡ እርስዎ የሚሰጡት መረጃ የስኳር በሽታቸውን ለመቆጣጠር መርፌ ለሚጠቀሙት ሰዎች ሁሉ ሥልጠናና ትምህርት ለማሻሻል ጥቅም ላይ ይውላል ።

የI-care ቁጥር _____ መጠይቅ የተደረገበት ቀን _____

ክፍል 1: መሰረታዊ ባህሪዎች

1. ዕድሜ? _____ ዓመት
2. ጾታ? (በማየት ይመዝግቡ)
    1. ወንድ
    2. ሴት
3. መኖሪያዎ የት ነው?
    1. ከተማ
    2. ገጠር
4. የአሁኑ የጋብቻ ሁኔታዎ ምንድን ነው?
    1. ያላገባ/ች
    2. ያገባ/ች
    3. የተፋታ/ች
    4. ባል/ሚስት የሞተበት/ባት
5. የትምህርት ደረጃዎ ምንድን ነው?
    1. አልተማርኩም
    2. የመጀመሪያ ደረጃ
    3. ሁለተኛ ደረጃ
    4. ከፍተኛ ትምህርት
6. የስራዎ ሁኔታ ባለፉት 12 ወራት ምንድን ነበር?
    1. የመንግሥት ሠራተኛ
    2. የግል ስራ
    3. የቤት እመቤት
    4. አርሶአደር
    5. ጡረተኛ
7. አማካይ ወርሃዊ ገቢዎ ምን ያህል ነው? _____ ብር
8. ክብደት _____ኪግ
9. ቁመት _____ሜ
10. የቅርብ ጊዜ የሂሞግሎቢን A1C መጠን_____%

ክፍል 2: የኢንሱሊን መርፌ አጠቃቀም ቴክኒኮች

11. የትኛው ዓይነት የስኳር በሽታ አለብዎ?
    1. ዓይነት 1 የስኳር በሽታ
    2. ዓይነት 2 የስኳር በሽታ
    3. በእርግዝና ጊዜ የተከሰተ የስኳር በሽታ
    4. ሌላ _____

12. ከስኳር በሽታ ጋር ለምን ያህል ጊዜ ኖረዋል?
    1. ከ6 ወር በላይ ግን ከ1 ዓመት በታች - የወሮችን ብዛት ይጠቁማሉ: _____ ወሮች
    2. ከ1 ዓመት በላይ - የዓመታትን ቁጥር ይጠቁማሉ: _____ ዓመት

13. የስኳር በሽታ በየትኛው እድሜዎ ላይ ተከሰተ? _____ ዓመት

14. ለስኳር ህመምዎ በአሁኑ ጊዜ ምን ዓይነት ሕክምና እየወሰዱ ነው? የሚመለከተውን ሁሉ ይምረጡ
    1. ክኒኖች (_____ አመት)
    2. ኢንሱሊን (_____ አመት)
    3. የ GLP-1 ሪሴፕተር ኣጎኒስት (_____ አመት)

15. በየኢንሱሊን ላይ ከሆኑ አጠቃላይ የሚወስዱት ዕለታዊ የመድሃኒትዎ መጠን ስንት ነው? _____IU

16. በመደበኛነት ኢንሱሊን ለመወጋት የሚጠቀሙበትን መሣሪያን ይምረጡ? የሚመለከተውን ሁሉ ይምረጡ
    1. ሲሪንጅ
    2. ኢንሱሊን የተሞላ የብዕር መርፌ
    3. ሌላ (ለምሳሌ የኢንሱሊን ፓምፕ)

17. በቀን ውስጥ ስንት ጊዜ የኢንሱሊን መርፌ ይወጋሉ?
    1. 1
    2. 2
    3. 3
    4. 4
    5. 5
    6. 6
    7. 7
    4. ከ 7 በላይ

18. በአሁኑ ጊዜ የሚጠቀሙበት የኢንሱሊን መርፌ ርዝመት ምን ያህል ነው? የሚመለከተውን ሁሉ ይምረጡ (በማሳየት ይመዝግቡ)
    1. 12.7 ሚሜ
    2. 12 ሚሜ
    3. 10 ሚሜ
    4. 8 ሚሜ
    5. 6 ሚሜ
    6. 5 ሚሜ
    7. 4.5 ሚሜ
    8. 4 ሚሜ
    9. አላውቅም

19. የኢንሱሊን መርፌን መወጋት ከጀመሩ በኋላ የሚጠቀሙበት መርፌ ርዝመት ተቀይሯል?

1. አዎ
2. አልተለወጠም፣ ወደ ጥያቄ 21 ይለፉ

20. መልስዎ አዎ ከሆነ ፣ በምን ምክንያት ርዝመቱ እንደተለወጠ ያውቃሉ? የሚመለከተውን ሁሉ ይምረጡ
1. መርፌ ሲወጉ የበለጠ ምቾት ለመስጠት
2. መርፌው ወደ ጡንቻው የመግባት አደጋን ለመቀነስ
3. የስኳር ማነስ የመከሰት አደጋን ለመቀነስ
4. አላውቅም

21. የኢንሱሊን መርፌዎችን በየትኞቹ የሰውነት ክፍሎች ላይ ይወጋሉ? የሚመለከተውን ሁሉ ይምረጡ
1. ሆድ
2. ታፋ
3. ቂጥ
4. ክንድ

22. ከአንድ በላይ የሰውነት ክፍሎች ላይ የሚወጉ ከሆነ በሚወጉት መሠረት ከ 1 እስከ 4 ደረጃ ይስጧቸው? (አብዛኛውን ጊዜ = 1 እና ሁለተኛ አብዛኛው ጊዜ = 2 ፣ ጥቅም ላይ ያልዋሉ ባዶ መተው ፣ ወዘተ?

_____ሆድ
_____ታፋ
_____ቂጥ
_____ ክንድ

23. የኢንሱሊን መርፌ በየትኛው የሰውነት ክፍል ላይ እንደሚወጉ እንዴት ይመርጣሉ?
1. እኔ ሁልጊዜ በተመሳሳይ ሰዓት በተመሳሳይ የሰውነት ክፍል ላይ መርፌ እወጋለሁ (ለምሳሌ: የጠዋት መርፌ ሁል ጊዜ ሆዴ ላይ)
2. ለአንድ ቀን ብቻ በተመሳሳይ የሰውነት ክፍል ላይ መርፌ እወጋለው
3. ለጥቂት ቀናት በተመሳሳይ የሰውነት ክፍል ላይ መርፌ እወጋለው
4. በማካሂደው አካላዊ እንቅስቃሴ መሠረት የምወጋበትን የሰውነት ክፍል እመርጣለሁ
5. የምወጋበትን የሰውነት ክፍል በማዘዋወር እቅዴ መሠረት እመርጣለሁ
6. የምወጋበትን የሰውነት ክፍል በተመለከተ የተለየ የምመርጠው የአወጋግ አካሄድ የለኝም
7. ምንም የማያመውን የሰውነት ክፍል እመርጣለሁ

24. በጥያቄ 21 ላይ የኢንሱሊን መርፌዎችን በየትኞቹ የሰውነት ክፍሎች ላይ እንደሚወጉ ገልጸዋል:: ከዚህ በታች ካሉት ሳጥኖች ውስጥ በሚወጉባቸው የሰውነት ክፍሎች ላይ የሚውጉበትን የቦታ መጠን የሚወክለውን አንዱን ይምረጡ::

	የፖስታ መጠን	የመጫወቻ ካርታ መጠን	የኤቲኤም ካርድ መጠን	የቴምብር መጠን
ሆድ				
ታፋ				
ቂጥ				
ክንድ				


K
K


Oromia International Bank
CARD
1234 5678 9876 5432
4567
12/14
Card holder name
ethioPay


ETHIOPIA
55

25. የሚወጉበትን የሰውነት ክፍል ያዘዋውራሉ?

1. አዎ
2. አላዘዋውርም፣ ወደ ጥያቄ 27 ይለፉ

26. መልስዎ አዎ ከሆነ ፣ ይህን ማዘዋወር እንዴት ይገልፀውታል? የሚመለከተውን ሁሉ ይምረጡ

1. ከቀኝ የሰውነቴ ክፍሎች ወደ ግራ አዘዋውራለሁ
2. ከአንድ ኢንሱሊን የምወጋበት የሰውነት ክፍል ወደ ሌላ የምወጋበት የሰውነት ክፍል አዘዋውራለሁ
3. ከዚህ በፊት ከተወጋሁበት ቦታ አንድ የጣት ስፋትን (1 ሴ.ሜ) ለክቼ እወጋለሁ
4. ኢንሱሊን በምወጋባቸው የሰውነት ክፍሎቼ ላይ በክብ ቅርጽ መልክ ዙሪያውን እወጋለሁ
5. ኢንሱሊን በምወጋባቸው የሰውነት ክፍሎቼ ላይ የመስመርን ቅርጽ ተከትዬ እወጋለሁ

27. ኢንሱሊን በሚወጉባቸው የሰውነት ክፍሎች ለተወሰነ ጊዜ (ሳምንታት ፣ ወራት ወይም ዓመታት) የቆየ በቆዳዎ ስር የሚገኝ እብጠት ወይም መጓነል አለ?

1. አለ
2. የለም፣ ወደ ጥያቄ 31 ይለፉ

28. መልስዎ አለ ከሆነ ፣ በየትኛው የሰውነት ክፍል(ሎች) ይገኛሉ? የሚመለከተውን ሁሉ ይምረጡ

1. ሆድ
2. ታፋ
3. ቂጥ
4. ክንድ

29. እነዚህን ያበጡ ወይም የጓነሉ ክፍሎችን መርፌ ይወጋሉ?

1. አዎ
2. አልወጋም፣ ወደ ጥያቄ 31 ይለፉ

30. መልስዎ አዎ ከሆነ፣ ለምን እንደሚወጉ ይምረጡ? የሚመለከተውን ሁሉ ይምረጡ

1. ምቹ ስለሆነ
2. ህመም ስሜቱ ስለሚቀንስ
3. ልማድ ስለሆነ (ሁልጊዜ እዚያ እወጋለሁ)
4. አላውቅም

31. ከመወጋትዎ በፊት ቆዳዎን በአልኮል ያፀዳሉ?

1. አዎ
2. አላጸዳም

32. መርፌውን ወደ ብልቃጡ ውስጥ ከማስገባትዎ በፊት ወይም የብዕር መርፌን ከብእሩ ጋር ከማያያዝዎ በፊት የብልቃጡን ክዳን ወይም የብዕር መርፌ ማቀፊያውን በፀረ-ነፍሳት (ለምሳሌ አልኮል) ያፀዳሉ?

1. አዎ
2. አላጸዳም

33. ኢንሱሊን የተሞላ ብዕር መርፌ የሚጠቀሙ ከሆነ፣ ማስገቢያውን ከተጫኑ በኋላ መርፌውን ከቆዳ ስር ለምን ያህል ጊዜ ይተዉታል?

1. ከ5 ሴኮንድ በታች
2. ከ5 - 10 ሴኮንድ
3. ከ10 ሴኮንድ በላይ
4. ለምን ያህል ጊዜ እንደገባ አላውቅም

34. ኢንሱሊን የተሞላ ብዕር የሚጠቀሙ ከሆነ፣ መርፌ ማቀፊያው ላይ የሚገጠመውን መርፌ ከአንድ ጊዜ በላይ ይጠቀማሉ?

1. አዎ
2. አልጠቀምም፣ ወደ ጥያቄ 40 ይለፉ

35. መልስዎ አዎ ከሆነ፣ አንድ ነጠላ ብዕር መርፌ ስንት ጊዜ ይጠቀማሉ?

1. 2 ጊዜ
2. ከ 3 እስከ 5 ጊዜ
3. ከ 6 እስከ 10 ጊዜ
4. ከ 10 ጊዜ በላይ

36. የብዕር መርፌ ማቀፊያው ላይ የሚገጠመውን መርፌ ከአንድ ጊዜ በላይ የሚጠቀሙ ከሆነ ለምንድነው የሚያደርጉት (ሁሉንም ተገቢ መልሶች ይምረጡ)?

1. ምክንያቱም ሌላ የብዕር መርፌ ስላልነበረኝ
2. ገንዘብ ለመቆጠብ
3. ከመጠን በላይ ብክነትን ለመከላከል (የአካባቢ ጥበቃ)
4. ቀላል ስለሆነ

37. የኢንሱሊን መርፌን የሚጠቀሙ ከሆነ ፣ ከአንድ ጊዜ በላይ መርፌውን ይጠቀሙበታል?

1. አዎ
2. አልጠቀምም፣ ወደ ጥያቄ 40 ይለፉ

38. መልስዎ አዎ ከሆነ፣ አንድ መርፌን ስንት ጊዜ ይጠቀማሉ?

1. 2 ጊዜ
2. ከ 3 እስከ 5 ጊዜ
3. ከ 6 እስከ 10 ጊዜ
4. ከ 10 ጊዜ በላይ

39. መርፌውን ከ 1 ጊዜ በላይ የሚጠቀሙ ከሆነ ለምንድነው የሚያደርጉት (ሁሉንም ተገቢ መልሶች ይምረጡ)?

1. ምክንያቱም ሌላ መርፌ ስላልነበረኝ
2. ገንዘብ ለመቆጠብ
3. ከመጠን በላይ ብክነትን ለመከላከል (የአካባቢ ጥበቃ)
4. ቀላል ስለሆነ

40. መርፌ ሲወጉ የህመም ስሜት አለ?

1. አዎ
2. የለም፣ ወደ ጥያቄ 43 ይለፉ

41. መልስዎ አዎ ከሆነ ፣ መርፌ አወጋጎትን እንዴት ይገልፁታል?

1. ሁሌም ህመም ያስከትላል
2. አብዛኛውን ጊዜ ህመም ያስከትላል (በሳምንት ውስጥ በርካታ ቀናት)
3. አንዳንድ ጊዜ ህመም ያስከትላል (በወር ውስጥ በርካታ ቀናት)
4. አልፎ አልፎ ህመም ያስከትላል (በዓመት ውስጥ በርካታ ቀናት)

42. መርፌ ሲወጉ የህመም ስሜት ካለ ምክንያቱ ምን ይመስሎታል? (ተገቢ ሊሆን የሚችለውን ሁሉ ይምረጡ)

1. መርፌውን የተወጋሁበት ቦታ (ለምሳሌ ነርቭ ላይ ተወጋው)
2. የተወጋሁት የኢንሱሊን መጠን
3. ከዚህ በፊት መርፌውን ስለተጠቀምኩት

4. የመርፌ አወጋጌ ትክክል አልነበረም
5. የተወጋሁት ኢንሱሊን የሙቀት መጠን
6. አላውቅም

43. መርፌ የተወጉባቸው የሰውነት ክፍሎች የመድማት ወይም የመበለዝ ምልክት ያሳያሉ?
    1. አዎ
    2. አያሳዩም፣ ወደ ጥያቄ 45 ይለፉ
44. መልስዎ አዎ ከሆነ ፣ መርፌው መድማትን ወይም የመበለዝ ምልክትን ስንት ጊዜ ያስከትላል?
    1. ሁሌም
    2. አብዛኛውን ጊዜ (በሳምንት ውስጥ በርካታ ቀናት)
    3. አንዳንድ ጊዜ (በወር ውስጥ በርካታ ቀናት)
    4. አልፎ አልፎ (በዓመት ውስጥ በርካታ ቀናት)
45. ኢንሱሊን ከተወጉ በኋላ ኢንሱሊን ተመልሶ ከቆዳ ወደ ውጭ ይወጣል?
    1. አዎ
    2. አይወጣም፣ ወደ ጥያቄ 47 ይለፉ
46. መልስዎ አዎ ከሆነ ፣ ኢንሱሊን ከተወጉ በኋላ ኢንሱሊን ተመልሶ ከቆዳ ወደ ውጭ ስንት ጊዜ ይወጣል?
    1. ሁሌም
    2. አብዛኛውን ጊዜ (በሳምንት ውስጥ በርካታ ቀናት)
    3. አንዳንድ ጊዜ (በወር ውስጥ በርካታ ቀናት)
    4. አልፎ አልፎ (በዓመት ውስጥ በርካታ ቀናት)
47. ኢንሱሊን ከተወጉ በኋላ በመርፌዎ ጫፍ ላይ የኢንሱሊን መንጠባጠብ ወይም ፈሳሽ መፍሰስ አለ?
    1. አዎ
    2. የለም፣ ወደ ጥያቄ 49 ይለፉ
48. መልስዎ አዎ ከሆነ ፣ እንዲህ ዓይነቱን ከመርፌ የኢንሱሊን መንጠባጠብ ወይም ፈሳሽ መፍሰስ ምን ያህል ጊዜ ይመለከታሉ?
    1. ሁሌም
    2. አብዛኛውን ጊዜ (በሳምንት ውስጥ በርካታ ቀናት)
    3. አንዳንድ ጊዜ (በወር ውስጥ በርካታ ቀናት)
    4. አልፎ አልፎ (በዓመት ውስጥ በርካታ ቀናት)
49. ከልብስዎ በላይ የኢንሱሊን መርፌ ይወጋሉ?
    1. አዎ
    2. አልወጋም፣ ወደ ጥያቄ 51 ይለፉ
50. መልስዎ አዎ ከሆነ ፣ በየስንት ጊዜው ከልብስዎ በላይ የኢንሱሊን መርፌ ይወጋሉ?
    1. ሁሌም
    2. አብዛኛውን ጊዜ (በሳምንት ውስጥ በርካታ ቀናት)
    3. አንዳንድ ጊዜ (በወር ውስጥ በርካታ ቀናት)
    4. አልፎ አልፎ (በዓመት ውስጥ በርካታ ቀናት)
51. ድፍርሱን ኢንሱሊን ወይም ከሱ ጋር በአንድ ብልቃጥ የተዘጋጀ ኢንሱሊን የሚጠቀሙ ከሆነ፣ ሳይጠቀሙ በፊት ኢንሱሊንዎን ደጋግመው ያቀላቅላሉ?
    1. አዎ
    2. አላቀላቅለውም፣ ወደ ጥያቄ 53 ይለፉ

52. መልስዎ አዎ ከሆነ ፣ በአማካኝ ስንት ጊዜ ከመወጋትዎ በፊት ብዕሩን ወይም የኢንሱሊን ብልቃጡን ያንከባልላሉ ወይም ያገላብጣሉ_____ ጊዜ
53. ኢንሱሊን የተሞላ የብዕር መርፌ ወይም የኢንሱሊን ብልቃጥ መጠቀም ከመጀመርዎ በፊት የት ያስቀምጡታል?
    1. ማቀዝቀዣ / ፍሪጅ
    2. መታጠቢያ ቤት ፣ ቦርሳ ፣ መሳቢያ ወይም ሌላ - በክፍል የሙቀት መጠን ላይ
54. ኢንሱሊን የተሞላ የብዕር መርፌ ወይም የኢንሱሊን ብልቃጥ መጠቀም ከጀመሩ በኋላ የት ያስቀምጡታል?
    1. ማቀዝቀዣ / ፍሪጅ
    2. መታጠቢያ ቤት ፣ ቦርሳ ፣ መሳቢያ ወይም ሌላ - በክፍል የሙቀት መጠን ላይ
55. በማቀዝቀዣ/ፍሪጅ ውስጥ የሚጠቀሙበትን ኢንሱሊን ካስቀመጡ፣ ከመወጋትዎ በፊት ወደ ክፍሉ የሙቀት መጠን እንዲሞቅ ያደርጋሉ?
    1. አዎ
    2. አላደርግም
56. ጊዜው ካለፈበት ቀን በኋላ የኢንሱሊንዎን ብልቃጥ ወይም በብዕር መርፌ ውስጥ የሚገባን ኢንሱሊን ተጠቅመው ያውቃሉ?
    1. አዎ
    2. አላውቅም
    3. በኢንሱሊን ላይ ጊዜው የሚያበቃበትን ቀን ዘወትር አልከታተልም
57. ያገለገሉዎትን የብዕር መርፌዎችን ወይም የኢንሱሊን መርፌዎችን እንዴት ይጥላሉ?
    1. ለተገለገሉ መርፌዎች በተዘጋጀ ልዩ ማጠራቀሚያ ውስጥ እጥላለው
    2. እንደ ባዶ ጠርሙስ ያሉ ቤት ውስጥ በተዘጋጁ ማጠራቀሚያዎች እጥላለው
    3. መርፌዎቹን ከድኜ በቆሻሻ መጣያ ውስጥ እጥላለው
    4. መርፌዎቹን ሳልከድን በቆሻሻ መጣያ ውስጥ እጥላለው
    5. የመርፌዎቹን ጫፍ ቆርጬ ለይቼ በመያዣ እጥላለው
58. በማጠራቀሚያ ውስጥ የሚጥሉ ከሆነ ፣ ማጠራቀሚያውን ምን ያደርጉታል?
    1. በቆሻሻ መጣያ ውስጥ ውስጥ እጥለዋለው
    2. ወደ ሆስፒታል ወይም ክሊኒክ እወስደዋለው
    3. ወደ አካባቢዬ የሚገኝ መርፌ የሚሰበስብ አካል እወስደዋለው
    4. ከላይ ከተዘረዘሩት ውስጥ አንዳቸውም አይደሉም
59. የኢንሱሊን መርፌ ሳይወጉ የቀሩበት ጊዜ አለ?
    1. አዎ
    2. የለም፣ ወደ ጥያቄ 62 ይለፉ
60. መልስዎ አዎ ከሆነ ፣ ይህ ምን ያህል ጊዜ ይከሰታል?
    1. አብዛኛውን ጊዜ (በሳምንት ውስጥ በርካታ ቀናት)
    2. አንዳንድ ጊዜ (በወር ውስጥ በርካታ ቀናት)
    3. አልፎ አልፎ (በዓመት ውስጥ በርካታ ቀናት)
61. የኢንሱሊን መርፌ ሳይወጉ የቀሩባቸው ምክንያቶች ምንድን ናቸው? (የሚመለከተውን ሁሉ ይምረጡ)
    1. ረስቼው
    2. ምግብ ስላልበላው
    3. ታምሜ ነበር (ለምሳሌ ማቅለሽለሽ እና ማስታወክ)
    4. መወጋት ስላልፈለኩ

5. የግሉኮስ መጠኔ በጣም ዝቅተኛ ስለነበር

62. የኢንሱሊን መርፌዎትን እንዴት መወጋት እንደሚችሉ ያስተማሮት ማነው?
    1. አጠቃላይ ነርስ
    2. የስኳር በሽታ ነርስ
    3. የስኳር በሽታ አስተማሪ
    4. ዶክተር (ጠቅላላ ሀኪም)
    5. ዶክተር (የስኳር በሽታ ስፔሻሊስት)
    6. ፋርማሲስት
    7. የኢንሱሊን ብዕር ወይም መርፌ አምራች ተወካይ

63. የኢንሱሊን መርፌ የሚወጉባቸውን የሰውነት ክፍሎች ምን ያህል ጊዜ በነርስ ወይም በዶክተር ይመረመራሉ?
    1. በመደበኛነት በእያንዳንዱ ቀጠሮዬ። ይህ በምን ያህል ጊዜ እንደሆነ ይግለጹ፣በ_____ወር
    2. በአመት አንዴ
    3. በምወጋበት የሰውነት ክፍል ላይ ችግር እንዳለ ከተናገርኩ ብቻ
    4. መርፌ የምወጋባቸውን የሰውነት ክፍሎቼ መቼ እንደተመረመሩ አላስታውስም

64. ስለ የኢንሱሊን መርፌ አወጋግ መጀመሪያ ሲማሩ ወይም ከዚያን ጊዜ ጀምሮ በማንኛውም ጊዜ ትምህርቱ ተሸፍኖ ከሆነ አዎ ብለው ይምረጡ? በመመሪያው ላይ ተጨማሪ ስልጠና እንደሚያስፈልግዎ ከተሰማዎት የመጨረሻውን አምድ ይምረጡ?

ቁጥር	መመሪያዎች	አዎ	አሁንም ተጨማሪ ስልጠና ያስፈልገኛል
1	የሚወጉባቸውን የሰውነት ክፍሎች (ለምሳሌ ታፋ ፣ ክንድ ፣ ቂጥ ፣ ሆድ ላይ)		
2	የቆዳ ውፍረት እና ተገቢ የመርፌ ጥልቀት		
3	የመርፌ ርዝመት		
4	ቆዳን እንዴት ከፍ ማድረግ እንደሚቻል ወይም ቆዳን እንዴት እንደሚያዝ		
5	ቆዳን ለምን ያህል ጊዜ ከፍ አድርጎ መያዝ እንደሚቻል		
6	መርፌ ወደ ቆዳ ሲገባ ያለው አቀማመጥ (በ90º ወይም በ45º ዘንበል ብሎ)		
7	መርፌ ከቆዳ ስር ከገባ በኋላ ለምን ያህል ጊዜ እንደሚቆይ		
8	የኢንሱሊን የሚወጉበትን የሰውነት ክፍል ማዘዋወር		
9	በኢንሱሊን መርፌ ውስጥ የአየር አረፋ እንዳይፈጠር ለመከላከል ወይም ትክክለኛ የብዕር መርፌ ቅድመ-ዝግጅት		
10	የተለያዩ ኢንሱሊኖችን በመርፌ ውስጥ ማደባለቅ (ለመርፌ ተጠቃሚዎች)		
11	ድፍርስ ኢንሱሊንን እንደገና ማቀላቀል		
12	የብዕር መርፌ / የኢንሱሊን መርፌ አንድ ጊዜ ብቻ መጠቀም እንደሚገባ		
13	ደህንነቱ የጠበቀ ያገለገሉ የብዕር መርፌዎች ወይም የኢንሱሊን መርፌዎች አወጋገድ		

65. ስለ የኢንሱሊን መርፌ አወጋግ የተሰጡ መመሪያዎችን የተቀበሉበት ወይም የከለሱበት የመጨረሻ ጊዜ መቼ ነበር?
    1. ባለፉት 6 ወራት ውስጥ
    2. ባለፉት 6-12 ወራት ውስጥ
    3. ባለፉት 1 እስከ 5 ዓመታት ውስጥ
    4. ባለፉት 5 እስከ 10 ዓመታት ውስጥ
    5. መመሪያዎችን አልተቀበልኩም

66. ባለፉት ስድስት ወራት ውስጥ የስኳር መጠን ማነስ አጋጥሞታል?
    1. አዎ
    2. አላጋጠመኝም፣ ወደ ጥያቄ 69 ይለፉ
67. መልስዎ አዎ ከሆነ ፣ ባለፉት ስድስት ወራት ውስጥ የስኳር መጠን ማነሱ በጣም ከባድ ሆኖ ከሌላ ሰው እርዳታ አስፈልጎት ነበር?
    1. አላስፈለገኝም
    2. ከ 1 እስከ 2 ጊዜ
    3. ከ 3 እስከ 5 ጊዜ
    4. ከ 5 ጊዜ በላይ
68. እነዚህ የስኳር መጠን ማነስ ክስተቶች በተፈጠሩ ጊዜ አምቡላንስ መጥራት ወይም ሆስፒታል/ክሊኒክ መሄድ አስፈልጎት ነበረ?
    1. አዎ
    2. አላስፈለገኝም
69. የደምዎን የስኳር መጠን ለመመርመር የጣትዎትን ጫፍ ስንት ጊዜ በመርፌ ይወጋሉ?
    1. በቀን ከ 4 ጊዜ በላይ
    2. በቀን ከ 3 እስከ 4 ጊዜ
    3. በቀን ከ 1 እስከ 2 ጊዜ
    4. በሳምንት ውስጥ በርካታ ጊዜ
    5. የደምን የስኳር መጠን አልፎ አልፎ ወይም በጭራሽ አልመለከትም
70. የደም ስኳርና የኪቶን መጨመር ተከስቶ ወደ ሆስፒታል ፣ ድንገተኛ ክፍል ወይም ክሊኒክ ገብተው ያውቃሉ?
    1. አዎ
    2. አላውቅም፣ ወደ ጥያቄ 72 ይለፉ
71. መልስዎ አዎ ከሆነ ፣ መቼ እንደነበር ያመልክቱ?
    1. የደም ስኳርና የኪቶን መጨመር ነበረኝ ግን የስኳር በሽታ ለመጀመሪያ ጊዜ ሲገኝ ብቻ ነበር
    2. የደም ስኳርና የኪቶን መጨመር ነበረኝ ግን ባለፉት ስድስት ወራት ውስጥ አይደለም
    3. ባለፉት ስድስት ወራት ውስጥ የደም ስኳርና የኪቶን መጨመር ነበረኝ
72. በተደጋጋሚ የደም ስኳር መጨመር (የደም ስኳር መጠን ከ 250 ሚግ/ዴሊ በላይ መሆን) ያጋጥማል?
    1. አዎ
    2. አያጋጥምም፣ ወደ ጥያቄ 74 ይለፉ
73. መልስዎ አዎ ከሆነ ፣ ይህ ከፍተኛ የደም ስኳር መጨመር ምን ያህል ጊዜ ይከሰታል?
    1. ከ 5 በላይ ከፍተኛ ንባቦች በሳምንት
    2. ከ 3 እስከ 5 ከፍተኛ ንባቦች በሳምንት
    3. 1 ወይም 2 ከፍተኛ ንባቦች በሳምንት
    4. አልፎ አልፎ ከፍተኛ ንባብ (በወር ከ 4 ጊዜ በታች)
74. በአካባቢዎ እርስዎ በተጠቀሙባቸው መርፌዎች በድንገት ሊወጉ የሚችሉ ሰዎች አሉ?
    1. አሉ
    2. የሉም፣ ጨርሰዋል።
75. መልስዎ አሉ ከሆነ ፣ ለዚህ አደጋ የተጋለጡትን ሰዎች ይለዩ? (ተገቢውን ያህል ይምረጡ)
    1. ልጆች
    2. ሌሎች የቤተሰብ አባላት (ለምሳሌ የትዳር አጋር)

3. ነርስ ወይም ሌላ ባለሙያ
4. የቤት ሰራተኛ ወይም የአካባቢ ቆሻሻ ሰብሳቢ

76. ከእነዚህ ሰዎች መካከል እርስዎ በተጠቀሙባቸው መርፌዎች ድንገት ጉዳት የደረሰባቸው አሉ?
1. አዎ
2. የሉም

77. እነዚህ ሰዎች ለምን ለዚህ አደጋ የተጋለጡ ሊሆኑ እንደሚችሉ ይምረጡ? (ተገቢውን ያህል ይምረጡ)
1. በሌሎች ላይ ጉዳት እንዳይደርስ የሚከላከሉ የደህንነት መጠበቂያ ያላቸው መሳሪያዎችን ስለማልጠቀም
2. ለተጠቀምኩባቸው መርፌዎች የተዘጋጀ ተገቢ ማጠራቀሚያ ስለሌለኝ
3. የተጠቀምኩባቸው መርፌዎች አንዳንድ ጊዜ ሌሎችን ሊወጉ በሚችሉባቸው ቦታዎች ሊቀመጡ ስለሚችሉ
4. እኔ የጉበት ቫይረስ ወይም ሌላ በደም ሊተላለፍ የሚችል በሽታ ስላለብኝ

ስለ ጊዜዎ እናመሰግናለን ።