

Diabetes and Migration

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The practical recommendation “Diabetes and Migration” of the German Diabetes Society e. V. (DDG) was prepared for the first time and in cooperation with the Austrian Diabetes Society (ÖDG). The practice recommendation is intended to supplement the existing guidelines on diabetes mellitus and provides practical recommendations for the diagnosis, therapy and care of people with diabetes mellitus who come from different linguistic and cultural backgrounds.

Definition (Migration Background and Generation)

The population with a migration background includes people with their own migration experience and all those who have at least one parent or grandparent to whom this applies [1]. Different definitions or changes in what is understood by a migrant background make it difficult to have a uniform and consistent view [2].

In the context of therapy, in addition to the pure migration background, the generational affiliation or the place of socialization plays an important role:

- First generation: socialization took place in the country of origin and immigration took place in adulthood.
- Second generation: children of the first generation born here or whose family moved here when they were under 18 years old. Their socialization has taken place, at least in part, in Germany.
- Third generation: first-generation grandchildren and second-generation children. Their socialization has taken place entirely in Germany.

Data Situation

In many official statistics and routine data, nationality is still considered the predominant distinguishing feature, which is used to

represent only a selective part of the migrant population, however socio-demographic information is missing. People with a migration background often differ in their health situation from people without a migration background simply because of their younger average age or their poorer social situation. To make meaningful comparisons, the influence of these factors must be taken into account [2].

Despite an incomplete data situation in Germany, studies from comparable countries make it possible to obtain an approximate picture of the situation in Germany. Today, it can be assumed that more than 600 000 people with type 2 diabetes with a migration background are living in Germany. This number will continue to grow in the coming years for two main reasons. Firstly, the first generation of migrants is increasingly reaching retirement age and secondly, many of the refugees coming to Germany come from countries with a high risk of developing type 2 diabetes. This effect is increased when they migrate to industrialized countries [3].

Demographics for Germany

In 2019, about 21.2 million (26 %) people in Germany had a migration background. This represented an increase of 2.1 % over the previous year. The most important countries of origin continue to be Turkey (13 %), followed by Poland (11 %) and the Russian Federation (7 %) [4].

Currently, 2.3 million people from the Near and Middle East live in Germany. In addition, there is an increase in the number of people of African origin, although they only account for about 4 % of the population with a migration background [5, 6]. The resulting change in the population structure, combined with greater cultural diversity, poses major challenges for the health care system in Germany.

Since 2017, the micro census has been asking these persons about the main reason for immigration; the most important motive was family reasons.

Of the 24.0 million multi-person households in Germany, 2.5 million have predominantly used a foreign language. The most frequently used languages have been Turkish (17 %), Russian (15 %), Polish (8 %) and Arabic (7 %). The majority of multi-person households in which all household members had foreign roots communicated predominantly in a foreign language (55 %). If, on the other hand, only some of the household members had foreign roots, the proportion dropped to 7 % [5].

Prevalence for Germany

The risk of developing type 2 diabetes varies greatly among migrant populations. People from South and Central America, North and Sub-Saharan Africa, the Middle East and South Asia have very high prevalence rates [7]. Numerous European and American studies confirm that the prevalence, incidence and mortality of type 2 diabetes are usually higher among migrants than among the native population [8]. In addition, migrants are on average 5–10 years earlier and more likely to develop type 2 diabetes compared to the population in their home countries and to the population in their adopted country [3, 9].

A recent meta-analysis of the prevalence of ethnic minorities in Europe shows that migrants from South and Central America are 30 % more at risk than the native population.

In contrast, the risk is almost three times higher for migrants from the Middle East and North Africa and almost four times higher for migrants from South Asia [10–12].

Women of Turkish origin in Sweden have a 3-times higher risk of diabetes compared to Swedish women, whereas there is hardly any difference for men. This is the same for the hospitalization risk due to type 2 diabetes, although this effect is reduced in the second generation [13]. A study conducted in 7 European countries for 30 immigrant groups shows that the diabetes mortality rate for men and women is 90 % and 120 % higher respectively compared to the native population [14]. In addition, people with type 2 diabetes from Asia, the Middle East and sub-Saharan Africa have a particularly high risk of microvascular complications: diabetic retinopathy, nephropathy and peripheral neuropathy [15].

Increased disease rates are also seen in gestational diabetes. In Germany, for example, women of Turkish origin have a 33 % higher incidence rate of gestational diabetes compared to native Germans [16].

Demography for Austria

According to Statistics Austria, 8.9 million people live in Austria, of which a total of 2.0 million have a migrant background. This is 51 900 more than in 2017, which represents a share of about 23.7 % [17]. The group of first-generation immigrants comprises about 1 528 000 persons, while second-generation immigrants number about 542 000. The largest group comes from Germany with 200 000 persons, followed by 123 500 Romanians. In the course of 2019, these have overtaken Serbian (122 100) and Turkish citizens (117 600). Bosnia and Herzegovina occupy fifth place (96 600). The citizens of Hungary, Croatia, Poland, Syria and Afghanistan are in sixth to tenth place. In addition, migrants from Slovakia, the Russian Federation, Italy, Bulgaria, Kosovo and Macedonia are also strongly represented in Austria.

Prevalence for Austria

In Austria, the group of people suffering from diabetes mellitus is currently estimated at 515 000 to 809 000 people (approx. 7 to 11 %). The total includes 368 000 to 515 000 medically-diagnosed diabetes cases (approx. 5 to 7 %) and an estimated 147 000 to 294 000 diabetics (approx. 2 to 4 %). In the group of 0 to 14-year-olds, a proportion of people with diabetes of about 0.1 % is assumed for Austria (approx. 1600 children) [18]. According to the IDF (International Diabetes Federation), the prevalence of diabetes in Austria is 9.3 %. Among migrants, the prevalence is about 10–12 %, although a high number of undiagnosed patients is assumed [19]. In Vienna, a patient survey confirmed a diabetes prevalence of 10 % among Turkish migrants. Every third respondent had an increased risk of developing diabetes within the next five years [20]. Compared to native Austrians, migrants are 1.39 times more likely to develop diabetes among men and 3.4 times more likely among women [21].

Particularities in the Diagnosis and Therapy of Migrants with Diabetes

Due to their different cultural and individual backgrounds (level of education, reason and duration of migration, etc.), migrants often have a different understanding of health, healthcare, illness – especially chronic illness – than the native population. Knowledge of the connections between lifestyle and disease and of factors influencing the course of the disease often also differs from that of the native population [22]. In addition, lifestyle and nutritional habits in particular change as a result of the new social and economic conditions. Furthermore, external risk factors – structural deprivation – play an important role: these include location-specific (e. g. high unemployment), psychosocial factors (e. g. insecure employment) and environmental (e. g. noise, air pollution, climate change, etc.) factors [23].

The cultural background and in some cases a lack of language skills, illiteracy, low socio-economic status and difficulties in the process of cultural adaptation (acculturation) can therefore hinder access to medical preventative care and treatment. This is also reflected in the low percentage of migrants who seek screening [24].

Treatment of People with Migration Background and Diabetes in Practice

General conditions

The goals in the treatment of people with a migration background and diabetes are to enable an optimal transfer of knowledge and to strengthen the patients' personal responsibility. Appropriate information events are useful in order to increase knowledge about diabetes mellitus, the secondary and concomitant diseases as well as the relationship between the disease, diet and lifestyle. Starting points for this can be found in the respective communities with the involvement of all interest groups involved (such as cultural associations, religious communities, health insurance companies, medical societies, media).

In the inpatient and outpatient sector - especially in practices specializing in diabetology - a culturally sensitive approach with appropriately trained personnel (with special knowledge and understanding of the cultural influence on treatment) is an important prerequisite for successful therapy.

If a language barrier exists, training and treatment adapted to the mother tongue, educational level and lifestyle can be provided if possible. Intercultural content should be incorporated into the education, training and continuing education of healthcare professionals (doctors, diabetes advisors, diabetes assistants, dieticians, nutritionists, nursing staff, etc.). It is also recommended that bicultural and multilingual personnel be increasingly trained and promoted in health services. In anamnesis and therapy, it is important to consider bio-psycho-social influence factors and thus to keep religious attitudes as well as interfamilial and social hierarchies in mind (► **Fig. 1**).

Language

Communication during treatment should be in one language (treatment language). If necessary or possible, interpreting should be done by specialized interpreters or language and culture mediators.

Children are generally unsuitable as translators. If a professional interpreter is not available, adult relatives can be involved to assist. It is advisable to communicate using clear, simple, short sentences and general terms. If necessary, another language (including colloquial language) can be used or medical personnel with appropriate language skills can be involved, taking into account the obligation of confidentiality.

The DocCards shown below are recommended as a practical orientation aid for the procedure in doctor-patient consultations with and without an interpreter (refer to DocCards under DDG working materials <http://migration.deutsche-diabetes-gesellschaft.de/arbeitsmaterialien/doccards.html>) (► **Figs. 2, 3**)

In their guidelines on patients' rights, the Federal Ministry of Health (Bundesministerium für Gesundheit) and the Federal Ministry of Justice (Bundesministerium für Justiz) point out that every patient has the right to adequate opportunities for communication and appropriate information and advice, as well as to careful and qualified treatment. However, they do not mention the financing of professional interpreting services (► **Fig. 4**). The legal framework shown in ► **Fig. 4** is not valid for Austria.

Nutrition

Different cultures and regions can have very individual eating habits.

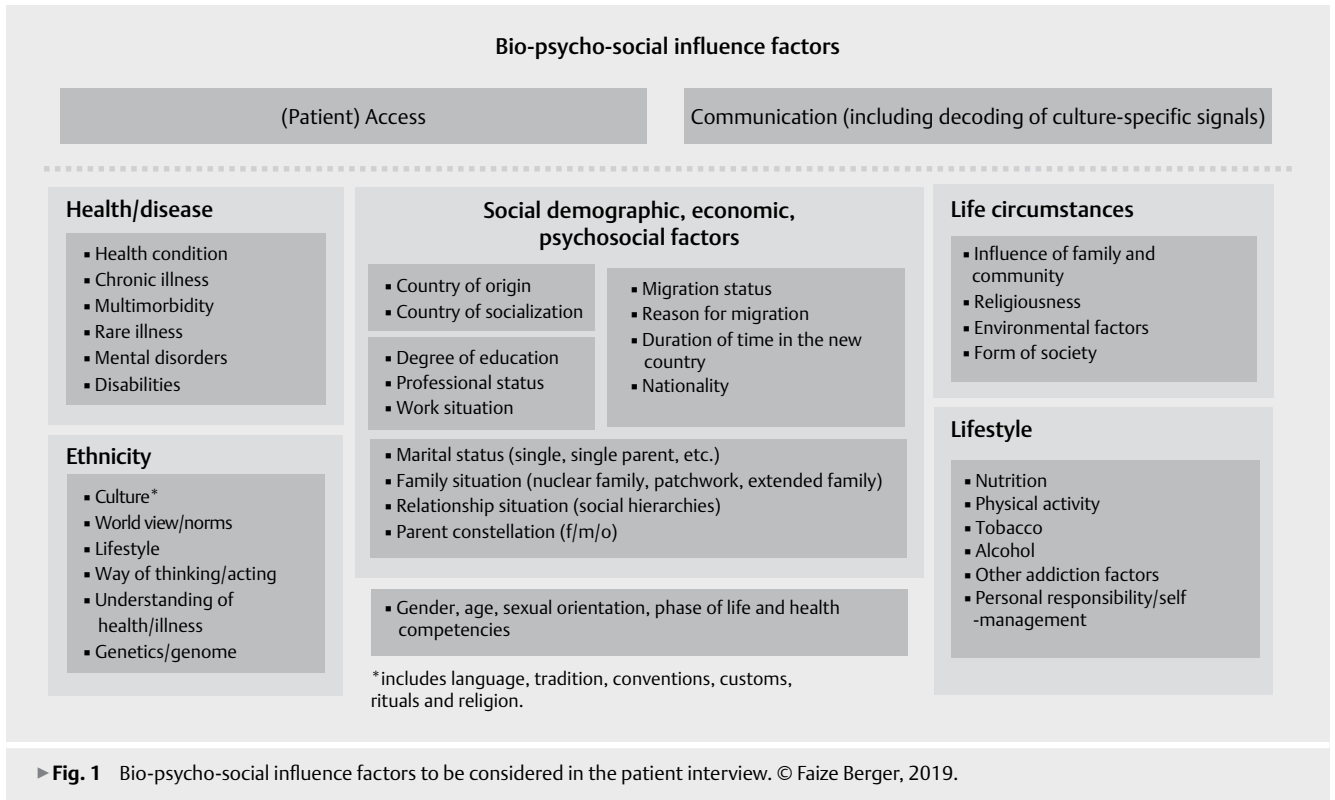
Food culture is shaped by geographical, historical, sociological, economic and psychological characteristics of a society and is shared by the corresponding members of a particular community. Culture is a fundamental determinant of “what we eat” [25].

Migrants often have different eating habits than natives. They sometimes prefer other foods, often eat more carbohydrates, have different meal concepts, a different understanding of portions, and different food preparation forms and food combinations. Their nutritional concepts are usually based on their own traditional cuisine, personal habits, and they also adopt the eating habits of the local population, often resulting in a new “mixed cuisine” [26]. It is not uncommon for special foods to be procured from the home countries. Migrants from some cultures have little use for the weight information in local recipes when cooking.

People have a highly variable postprandial glucose response to identical foods. Individualized culturally-sensitive counseling improves compliance [27].

In this context, fasting during Ramadan – religiously-influenced food selection and fasting regulations (see below), pregnancy and shift work play a special role.

In everyday practice, knowledge of the main carbohydrate sources and in what form and when the carbohydrates are eaten is indispensable. The following practice tool (► **Table 1**) for the nutrition of migrants is intended to provide initial information and assistance. A pragmatic regional breakdown with information on common cuisine forms the basis. The main sources of carbohydrates and other regional characteristics are presented in addition to the type (warm/cold) and number of meals.



Cuisines are quite diverse around the world and there is also a great deal of regional diversity. Nevertheless, it should be noted that many drinks have now made their way into many food cultures around the world, such as soft drinks, energy drinks, sweetened drinks and some beers.

Training and Training Material

Both culturally-sensitive individual training courses and target group-adapted group training courses enable effective communication of information about diabetes mellitus, its secondary and concomitant diseases, perception of hypo- and hyperglycemia and therapy.

Therapies tailored to the cultural needs of study participants in randomized controlled trials show a reduction in HbA1c and body fat values [28].

Training materials with culturally-sensitive examples should be available at least in the respective native languages and ideally be bilingual.

The use of pictograms, illustrations, symbols, demonstration utensils, especially pen needles, test strips, applicators, blood glucose meters, etc. is recommended not only to reach the illiterate people with diabetes, but also to provide effective training.

It is important for the portion sizes to be accurate when creating images of food and the like. For illiterates, the use of blood glucose meters with a large display or speaking meters is recommended (also available in foreign languages). At present, there is hardly any training material available on diabetes technology in the context of migration. The instructions for use of the devices cannot replace the need for training materials.

A selection of foreign language information and training materials has been compiled on the homepage of the DDG's Working Group on Diabetes and Migrants. In addition, the DDG's Working Group on Diabetes and Migrants has actively brought together important institutions in order to provide professional, culturally-sensitive working materials for nutritional counseling in diabetes mellitus.

Pregnancy - Gestational Diabetes Mellitus (GDM)

GDM occurs with above-average frequency among women with a migration background [29], but due to the great heterogeneity, migrant women or women with a migration background in general do not represent a specific uniform risk group for GDM.

The extent of the influence depends on the prevalence of the individual risk factors, the ethnicity of the population concerned and the specific migration situation [30].

A retrospective analysis conducted in Austria clearly shows the diversity of the individual migrant populations in connection with GDM. Data from 3293 pregnant women in a university hospital between 2013 and 2015 were evaluated taking into account the country of birth. The GDM risk for Turkish immigrant women was approximately twice as high as the risk of pregnant women born in Austria. The risk was about 1.5 times higher for women from Romania, Hungary and Macedonia [29].

Risk factors favoring the development of GDM were observed significantly more frequently among migrant women from Turkey, the Near and Middle East and Africa than among women born in



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Successful doctor-patient conversations despite language barriers - you know how!

BEFORE

- ✓ Clarify with the patient in which language you can communicate

LANGUAGE

- ✓ Formulate short and **simple, but complete** sentences
- ✓ Speak slowly and emphatically, but not too loud
- ✓ Use simple words
- ✓ Name, but then paraphrase technical terms

BODY LANGUAGE

- ✓ Use **more mimic and gestural** means
- ✓ Pay increased attention to a friendly, **positive body language**
- ✓ Pay increased attention to facial expressions, gestures and body language of the patient

UNDERSTAND

- ✓ **Supplement** your statements with drawings if possible
- ✓ Ask the patient to **summarize** what she has understood at relevant points (at minimum at the end of the appointment)

A separate DocCard is available if a conversation with an interpreter is required



Deutsche Diabetes Gesellschaft

Info Film



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Successful doctor-patient conversations with interpreters - you know how!

BEFORE the interview:

Inform the interpreter* about:

- ✓ Content, goal and estimated duration of the appointment
- ✓ The need for a translation that is as **literal** and **complete** as possible
- ✓ without personal interpretations, even if patient statements seem unpleasant, illogical or inappropriate
- ✓ with the translation of personal requests
- ✓ with the translation of comments such as "I wonder if..."; "You seem to me to give the impression that..."
- ✓ with the translation of emotional expressions and colors

- ✓ The importance of always translating in the first person
- ✓ The possibility to ask at any time in case of comprehension problems
- ✓ The possibility to make notes on names, numbers, details, if necessary
- ✓ The duty of confidentiality to which the interpreter is also subject

In the appointment:

- ✓ Introduce not only yourself, but also the interpreter and patient to each other by name
- ✓ Inform the patient that the interpreter is also subject to confidentiality

A separate DocCard is available for use in a conversation without an interpreter



Deutsche Diabetes Gesellschaft

Info Film

✓ **Keep eye contact** with the patient even when the interpreter is speaking

✓ Always address the patient **directly**, never talk about him/her in the third person

✓ Use more mimic and gestural means Formulate **clear, distinct** and complete sentences

✓ Ask only one or a few questions at a time, give only a **little information at once**

✓ After translating the patient's answers, **pause** in each case to wait for patient questions if necessary

✓ Check with the patient if interpreted patient statements do not make sense to you or do not seem to match your questions

✓ Respond directly to the patient when he or she seems to understand something in your language

✓ Ask the patient to **summarize** what she has understood at relevant points (at minimum at the end of the appointment)

After the appointment:

- ✓ Ask the interpreter if he or she had the impression that the patient could follow the conversation and understand everything
- ✓ Ask the interpreter for a short feedback on the way you conducted the conversation
- ✓ Give the interpreter brief feedback on her work (including any problematic areas of the discussion)
- ✓ Thank the interpreter for his support



Info Film

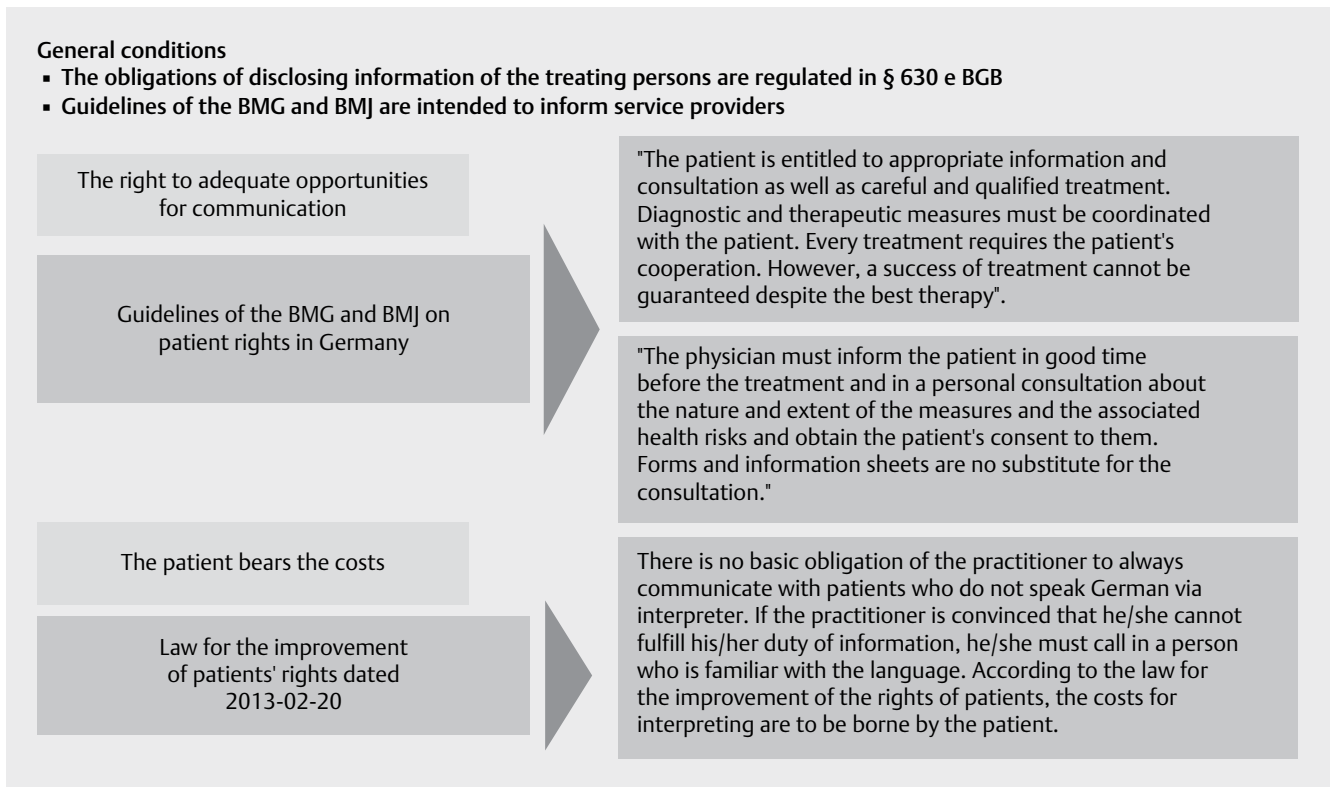


Information des Europäischen Parlaments

* refers to patients of all genders

► Fig. 2 DocCard - Language barriers.

► Fig. 3 DocCard – Interpreting.



► **Fig. 4** General conditions for the education of patients and service providers based on the BMG and BMJ guidelines on patient rights in Germany 2005 [Source for the guidelines: Federal Ministry of Health and Federal Ministry of Justice (Bundesministerium für Gesundheit und Bundesministerium für Justiz) (2007): Patient rights in Germany, Guidelines for Doctors (Patientenrechte in Deutschland, Leitfaden für Ärztinnen/Ärzte). Berlin. <https://www.bundesgesundheitsministerium.de/uploads/publications/BMG-G-G407-Patientenrechte-Deutschland.pdf> (Dated: 2015-09-20)] and the Law for the Improvement of Patients' Rights (Gesetz zur Verbesserung der Rechte von Patientinnen und Patienten) [Bundesgesetzblatt Jahrgang 2013 Teil I Nr. 9, p. 277-282]. BMG: Federal Ministry of Health (Bundesministerium für Gesundheit), BMJ: Federal Ministry of Justice (Bundesministerium für Justiz).

Austria or migrant women from other European countries. These include the genetically-higher risk of developing type 2 diabetes over the course of life, excess weight/obesity, higher parity and higher risk of GDM. Similarly, the probability of developing manifest type 2 diabetes mellitus later in life is also higher.

Women with a low socio-economic status and migration background often have difficulties in understanding the requirements for GDM self-management.

To improve adherence to treatment plans, they need education and support services that are culturally appropriate and that also aim at low levels of literacy [31].

Obesity/excess weight

In certain migrant populations - especially among women from the Middle East, Turkey, and North and South Africa - numerous studies have found a clear prevalence of excess weight and obesity. For pregnant women from Turkey and North Africa, a French birth cohort study of 18 000 women also showed a significantly higher risk of excess weight/obesity and GDM. Women from Eastern Europe and Asia, on the other hand, have a lower weight risk but still a higher risk of developing GDM than pregnant women without a migration background [32].

Pre-conception care of the migrant women already reduces the risk of complications.

Nutrition

During pregnancy, nutrition, coupled with cultural and traditional characteristics, is of increased importance. For example, it is commonly observed that pregnant women think that they should eat "for two". The idea of giving in to pregnancy cravings is also often consciously supported.

It is therefore absolutely essential to provide culturally-sensitive training, develop an individual nutrition plan and closely monitor its implementation and adaptation, especially with migrant women who come from risk regions. In the context of a planned or existing pregnancy it is essential to provide. The practice tool on nutrition (► **Table 1**) can be used for orientation and as a preliminary aid regarding the main carbohydrate sources in the respective native cuisine.

Vitamin D deficiency

Direct sunlight is very high in the country of origin for people from Africa, the Near and Middle East and the Indo-Asian region and they are usually undersupplied with regard to vitamin D status after migration to Europe. The results of studies on the effect of vitamin D deficiency on GDM are not clear [33]. In general, however, a vitamin D deficiency is an avoidable health risk.

► **Table 1** Practice tool for nutrition. This table does not replace the guideline recommendations for nutrition.

| Assignment | Meals c = cold w = warm | Time of Main meal | Main carbohydrate sources | Beverages | Special features |
|--|----------------------------|----------------------------------|--|--|---|
| Mediterranean cuisine | | | | | |
| Z. B. Turkey-Mediterranean coast, Greece, Spain, France, Italy, Israel ^{1,2} | c-w-w | In the evening (relatively late) | Wheat bread (flatbread/sour dough bread), noodles, rice, bulgur, polenta (Italy), potatoes | Tea (drunk with or without sugar), coffee + milk + sugar, mocha + sugar, wine (from midday), alcohol with meze/tapas | Ayran = yoghurt drink, mainly yoghurt sauces (TR), lots of vegetables, lots of fruit (fresh and dried), nuts, pasta specialties (pizza, croissant, börek, pita etc.), fish *, Helva (sweetened sesame paste), religiously kosher and halal preparations Fats: mostly olive oil |
| Balkan cuisine (southeast European) | | | | | |
| Z. B. Bulgaria, Serbia, Kosovo, Montenegro, Albania, Bosnia-Herzegovina, Slovenia, Croatia, Romania, Hungary | c-w-w | Evening | Wheat bread, potatoes, rice, pasta specialties (dumplings, burek) | Tea (drunk with or without sugar), coffee | Similar to the Mediterranean cuisine, with a high fat content, lots of meat * and sauces, sweet yeast bread (Povitica, Kolachki), polenta, dumplings (Romania, Hungary), pudding for dessert |
| Eastern European Cuisine | | | | | |
| Z. B. Russia, Poland, Baltic States ⁶ | c-w-w | Lunch and dinner | Rye bread, buckwheat (Kasha, blinies), dumplings, rice, dumplings, potatoes, wheat bread | tea (drunk with sugar, honey, milk or jam) wine, vodka, brandy | Fatty, semolina/oatmeal porridge prepared for breakfast with milk, a lot of stew with meat broth, a lot of sauces, soups with potatoes as the main ingredient, desserts prepared with condensed milk |
| Oriental cuisine | | | | | |
| Z. B. Iran, Afghanistan, Syria, Arab Mediterranean countries, Southeast Anatolia ^{1,5} | c-w-w | In the evening (relatively late) | rice, wheat bread, legumes (especially chickpeas) | Tea (black, green and apple tea) and coffee (usually sweetened with lots of sugar or honey) | Fruit: Pomegranate (fruit and as syrup), dates, figs, pasta specialties hearty (like burek) and sweet (like baklava), dessert: Knefeh (wheat dough with cheese, rose water and sugar syrup), baklava, Halawa (sweetened sesame paste), many herbs, no pork, rice dishes z. T. with vermicelli, tahin (sesame paste), humus (chickpea paste), nuts Fats: olive oil, butter, sheep's tail fat (delicacy) |
| North African Cuisine | | | | | |
| Z. B. Morocco/Maghreb, Mauritania ³ | w-w-w | Evening | Wheat bread, rice, potatoes (in tagine), pulses (chickpeas/humus), couscous, shombi (milk, rice or corn in the evening), baghrir (semolina with honey or sugar for breakfast), makroudh (semolina with date filling) | Juices, mint tea + sugar | Harira soup (with rice or vermicelli served with dates), Shombi (milk, rice or corn/evening), Tagin with caramelized fruits (Tagine Lahlou), fruit, meat *, fish * Fats: olive oil, argan oil and butter |
| African cuisine (without North Africa) | | | | | |
| Sub-Saharan African countries | w-w-w | Evening | yams (starch supplier), plantains, sweet potatoes, potatoes, cassava, millet | millet beer, Mageu (fermented corn porridge), beer, raw sugar schnapps, coffee liqueur, but also wine | Fufu (a tough porridge made from various ingredients such as plantains, sweet potatoes, corn, manioc and/or yams), curry with meat, fruits, fish *, lots of meat *, Koeksister (fried pastry, pulled through a special syrup and dried for dessert), Maroelas (the sour tasting fruits of the Marula tree) |
| East Asian Cuisine | | | | | |
| Z. B. Philippines, Indonesia, Japan, China ^{4,7} | w-w-w | Lunch and dinner | Rice (incl. Sushi), rice noodles (Thai), egg noodles (Indonesia), wheat, wheat noodles (Udon) also from buckwheat, mung beans or sweet potatoes | Tea, rice wine | Sweet and sour sauces, many soybean products, few dairy products in China, Japan and South Korea, for every meal short grain rice a lot of (also raw) fish *, fresh vegetables prepared briefly, soups |

▶ **Table 1** Continued

| Assignment | Meals c = cold w = warm | Time of Main meal | Main carbohydrate sources | Beverages | Special features |
|--|----------------------------|----------------------|--|--|---|
| South Asian Cuisine | | | | | |
| Z. B. India, Sri Lanka, Pakistan ⁵ | w-w-w | Lunchtime | Rice, wheat bread (Nan, Chapati), filled dumplings (Roti) | (Mango)lassi (thick and sweet yoghurt drink), tea with milk and honey/Sugar (Chai) | Spicy food, strong spices, coconut milk, lots of fried and breaded foods, yoghurt sauces, legumes (including Dal), tea + milk + sugar, pickled fruits (Rayta, Pachadi), milk-based Desserts |
| South American cuisine | | | | | |
| Z. B. Brazil, Venezuela, Argentina, Peru, Caribbean ⁵ | c-w-w | Evening | amaranth, quinoa, corn, rice, wheat, baked or fried empanadas, tapioca starch (obtained from cassava/massava flour), black beans, potatoes | Cachaca (sugar cane brandy), coconut juice, tequila, rum, wine, mate tea | Lots of fruit (e. g. camu camu, guavas, mango, papaya, passion fruit), soups, cuscuz (steamed food made from corn flour, the sweet variety of coconut couscous, in Brazil), often very spicy. Tacos (made from corn flour are very popular in Mexico), pulses (especially beans), regional or meat-heavy*. |

* Fish and meat are only considered if they represent an exceptional part of the diet in the region. Sources: ¹ J. Boucher, Mediterranean Eating Pattern, *Spectrum Diabetes Journals* 2017, p.: 1, <https://doi.org/10.2337/ds16-0074>; ² K. Cedrich, U. Ottersdorf, Ernährung und Raum: Regionale und ethnische Ernährungsweisen in Deutschland, S.: 104th Bundesforschungsanstalt für Ernährung, Karlsruhe, 2002; ³ F. Heidenhof, <https://www.bzfe.de/inhalt/hochkultur-bringt-esskultur-essen-in-nordafrika-und-im-nahen-osten-4808.htm>; ⁴ F. Deng, A. Zhang, C. Chan, [doi:10.3389/fendo.2013.00108](https://doi.org/10.3389/fendo.2013.00108); ⁵ N. Mora, S. H. Golden, Understanding Cultural Influences on Dietary Habits in Asian, Middle Eastern, and Latino Patients with Type 2 Diabetes: A Review of current Literature and Future Directions. *Curr Diab Rep* (2017) 17: 126/ <https://doi.org/10.1007/s11892-017-0952-6>; ⁶ Kittler, Suher, Nelms. *Food and Culture* 7e, 2017, S.184; ⁷ Kittler, Suher, Nelms. *Food and Culture*, 7e, 2017, S.305, S.:326.

For this reason, the vitamin D status of pregnant migrant women from the above-mentioned regions in particular should be assessed and consideration should be given to minimizing the risk, if necessary, by substitution.

Breastfeeding

Breastfeeding the newborn for at least 3 months reduces the mother's risk of diabetes mellitus [34]. The World Health Organization (WHO) therefore recommends full breastfeeding for at least 6 months. "Initial analyses of the breastfeeding behavior surveyed in KiGGS show that children with a migration background are breastfed more frequently and also longer than those without a migration background. 88.1 % of Russian-German children and 79.3 % of children of Turkish origin were breastfed more frequently than children without a migration background (76.2 %).

The fact that only three-quarters of the children grouped under "other" migrants received breast milk is an impressive indication of the heterogeneity within the migrant population" [35].

Migrant women should be motivated to breastfeed for at least 6 months, especially if they are overweight/obese.

Treatments with antibiotics

Antibiotic therapy during pregnancy leads to disrupted development of the microbiome in the newborn's intestine [36] in the post-natal period. Especially among the women who have fled to Germany since 2015, it can be assumed that they may have been exposed to antibiotic therapy more frequently than native women with and without a migration background. On the one hand, the group described above is more likely to carry multi-resistant germs, which could be an indicator for antibiotic use, and on the other hand, culturally-determined convictions regarding antibiotic therapy are added. For example, therapy with antibiotics is almost a cultural norm in the Iraqi population, and patients regard the prescription of antibiotics as an adequate standard therapy.

Therapeutic adherence and pregnancy testing for migrant women

As with some other subgroups, migrant women are particularly at risk for GDM due to the often low level of education, communication deficits, low health skills, and high unemployment. Without professional help, they find it difficult to find their way around the healthcare system. They often know neither the care processes and the importance of preparing for pregnancy, nor the prenatal and postnatal examinations that are a regular part of medical care and preventative care in Germany. Doctors should inform their patients with a migration background about preventative care options at an early stage. Physicians in private practice, on the other hand, report that younger migrant women who are familiar with the care structures regularly attend pre- and postnatal check-ups and show at least comparable, if not significantly higher, compliance compared to native women of their age. On the other hand, there are women who come to a birthing center or hospital with labor pains and the medical team can hardly obtain information about the course of their pregnancy to date due to communication problems. The team may also encounter these pregnant women for the first time and find that they have received little or no medical advice or support during their pregnancy. In connection with diabetes, preg-

nancy and migration, other factors such as health literacy, understanding of illness/health, influence and role of family, traditions, customs and rituals must also be taken into account. In the group of women who migrate because they are forced to flee and who have no proof of identity, other aspects such as traumatization, violence (including rape) and a higher number of abortions can be added in this context [37].

It would be desirable for the treating physicians to have a basic understanding of how pregnancy and maternity are understood in the respective cultures as well as basic psychosocial knowledge for dealing with trauma victims.

Fasting in General

Fasting is considered the voluntary complete or partial abstinence from meals, beverages and luxury food over a certain period of time; this is in contrast to starving where a lack of food exists. There are different reasons for fasting: health, mental, religious or physical, among others.

Fasting type and duration can vary greatly depending on the reason for the fasting.

In the following, the fasting month of Ramadan is discussed in more detail.

Ramadan – One Month of Fasting

Approximately 1.6 billion people around the world live with Islamic religious beliefs. Ramadan is the month of fasting for Muslims and the ninth month of the Islamic lunar calendar [38]. Fasting during Ramadan lasts one month. During the fasting period, from sunrise (Sahur = meal at sunrise or beginning of fasting) to sunset (Iftar = meal after sunset or breaking of fasting), no liquid or food may be consumed. Due to the lunar calendar, the fasting period is shifted forward by about 10 to 11 days every year. People with chronic diseases (including pregnant women and nursing mothers) are not obliged to fast. Many faithful Muslims with chronic diseases insist nevertheless on fasting but this should only take place under medical supervision [39]. According to the EPIDIAR study, about 43% of patients with type 1 diabetes and about 79% with type 2 diabetes fasted for at least 15 days during Ramadan [40]. A retrospective, 13-country study reported that 64% of patients fasted daily during Ramadan and 94% fasted for at least 15 days during that period [41]. Fasting is a special challenge for people with diabetes and their therapists. In general, an adjustment or modification of the existing therapy according to the current guideline recommendations of the DDG or ÖDG should be referred to before the start of the fasting period. If a person with diabetes wants to fast, the intake and dosages as well as the side effects (especially minimizing the risk of hypoglycemia) of the medication have to be adapted to the new eating habits. Since the main meal is at sunset, the day-night rhythm is reversed. In accordance with this rhythm, some medications, especially sulphonylureas and insulin therapy, need to be changed or their dosage adapted - the prevention of hypoglycemia is the main priority. Further complications during fasting are hyperglycemia, dehydration, increased risk of thrombosis and ketoacidosis [40].

In 2016, the IDF and DAR published a practice recommendation for patients with diabetes who want to fast during Ramadan [39]. Patients are assigned to different risk groups according to the assessment of their risk of developing one or more complications (as mentioned above) during fasting (► **Fig. 5**) [38].

Therapeutic Dosage Suggestions during the Fasting Period of Ramadan

The order of the substance groups does not correspond to the prioritization of the use according to the current guideline recommendation.

Oral antidiabetic therapy [38] (► **Table 2**)

Metformin

The dosage can be left as it is, it is taken with Sahur and İftar. If it is taken twice a day (e. g. 1000 mg of metformin), the dosage should be left as it is. In case of a triple dose (e. g. 500 mg of metformin) it is recommended to take 500 mg of metformin with Sahur and 1000 mg with İftar.

Acarbose

It is recommended to take it with meals without changing the dosage.

Sulfonylureas (SH)

The basic recommendation is to change to another substance class with a lower risk of hypoglycemia in accordance with the currently-valid guidelines of the DDG or ÖDG.

If the SH therapy is nevertheless to be continued, a change to the newer generations of sulfonylureas (e. g. gliclazide, glimepiride) is recommended. In case of one single dose, a dose reduction of 25% is recommended, as well as timing the dose to breaking the fast (İftar). If two doses are taken, it is recommended to reduce the morning dose as well (or skip it if no meal is taken with Sahur) and take the second dose for breaking the fast without changing the dose.

Glitazones

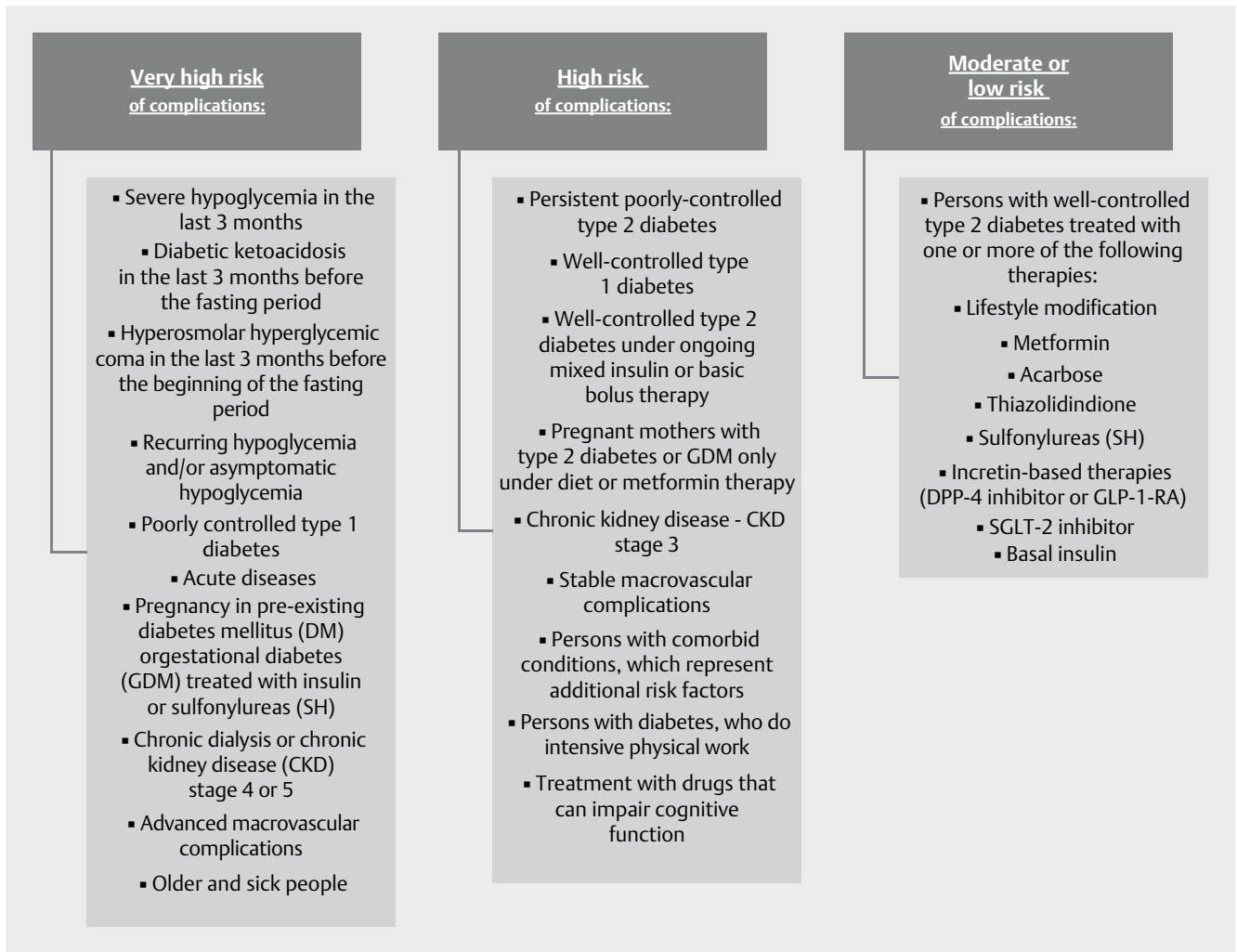
The dose is recommended without reduction with İftar or Sahur.

Dipeptidyl peptidase 4 inhibitor (DPP-4 inhibitor)

Recent data show that DPP-4 inhibitors (especially vildagliptin, sitagliptin) are a safe therapeutic alternative during fasting. The HbA1c value did not differ significantly from SH [42]. The use of DPP-4 inhibitors resulted in a lower risk of mild, symptomatic and severe hypoglycemia compared to SH [42, 43]. The dose of a DPP-4 inhibitor is not changed and can be taken at İftar [38].

Glucagon-like peptide-1 receptor agonist (GLP1-RA)

In the Treat-for-Ramadan study, liraglutide showed a lower risk of hypoglycemia than SH, as well as improvements in HbA1c and weight loss [39]. In addition, the LIRA-Ramadan study demonstrated the efficacy and safety of liraglutide over a 52-week observation period including fasting [39]. Liraglutide resulted in an improvement in fasting glucose levels, sustained weight loss and a reduction in HbA1c [43].



► **Fig. 5** Risk assessment regarding the occurrence of one and/or more complications during the fasting period.

► **Table 2** Therapy dosage suggestions during Ramadan for oral antidiabetic therapy.

| Medicine [38] | Adjustments | | Particularities |
|------------------|-------------------|---|---|
| | Dose modification | Time of administration | |
| Metformin | Yes | With Iftar 1 and Sahur 2 | Skip lunchtime dose, For 2 × 1000 mg: maintain dose with Iftar and Sahur, For 3 × 500 mg: with Iftar 1000 mg and Sahur 500 mg |
| Acarbose | None | With Iftar and Sahur | |
| Sulfonylurea | yes | Morning dose with Iftar, evening dose with Sahur | Preferably change SH therapy to another substance group with low risk of hypoglycemia. If SH-therapy is prescribed further, then preferably glimepiride or gliclazide, avoid glibenclamide. For single administration: take with Iftar, 25% dose reduction with good control, if necessary. If administered twice: reduce morning dose with Sahur by 25% if necessary. |
| Glitazone | None | With Iftar or Sahur | |
| DPP-4 inhibitors | None | With Iftar | |
| GLP1 agonists | None | With Iftar or Sahur | |
| SGLT2-inhibitors | None | With Iftar | Ensure that enough liquid is drunk after breaking the fast (Iftar) until Sahur! Caution with insulin deficiency: danger of euglycemic diabetic ketoacidosis [38]. |

1 Iftar: Breaking the fast at sunset. 2 Sahur: Start of fasting at sunrise.

► **Table 3** Therapy dosage suggestions during the fasting period of Ramadan for the insulin therapy.

| Therapy (insulin) [38] | Adjustment | Dosage | | | Particularities |
|---|-----------------|--|--|---|--|
| | | One dose | Two doses | Three doses | |
| BOT-basal supported oral therapy | Dose change | Dose reduction 15–30 % | Reduce the dose with Iftar ¹ 15–30 % and reduce the dose with Sahur ² by 50 %. | – | |
| | Administration | With Iftar | Move the morning dose to Iftar and move the evening dose to Sahur | – | |
| Rapid-acting insulin – functional insulin therapy | Dose change | None | Iftar dose unchanged, reduce Sahur dose by 25–50 % | Reduce Sahur dose by 25–50 % | Analog insulin recommended |
| | Administration | With Iftar | Iftar and Sahur | Skip midday dose | |
| Mixed insulin | Dose adjustment | None | Reduce Sahur dose by 25–50 % | Skip midday and reduce Sahur dose by 25–50 % | |
| | Administration | Move to Iftar | Move morning dose to Iftar, move evening dose to Sahur | Skip midday dose, otherwise the same as two doses | |
| Insulin pump | Dose change | Reduce the basal rate by 20–40 % 3–4 h before Iftar, shortly after Iftar: increase by 0–30 % | | | Insulin bolus depends on carbohydrate amount and insulin sensitivity |

¹Iftar: Breaking the fast at sunset. ²Sahur: Start of fasting at sunrise.

Sodium-dependent glucose transporter-2-Inhibitor (SGLT2-Inhibitor)

No dose reduction is recommended for this, the dose can be taken with Iftar. It is important to drink enough liquids after breaking the fast (Iftar) up to Sahur. Taking SGLT2-inhibitors is possible for well-adjusted diabetes patients with stable metabolism, good kidney function and who do not have an increased risk of dehydration [44].

In principle, the risk of hypoglycemia is low and the weight reduction caused by renal glucosuria is beneficial. However, given the risk of euglycemic diabetic ketoacidosis, caution is advised in cases of insulin deficiency [45]. Ketone measurements are required for all patients who decide to fast and are on SGLT2-inhibitor therapy [46].

Combination preparations of different substance classes

The hypoglycemic effects and corresponding dosage recommendation or adaptations of the respective substance groups must be taken into account, as already mentioned above.

Insulin therapy during fasting (► Table 3)

BOT - basal-supported oral therapy

It is recommended to reduce the single basal insulin daily dose by 15 to 30 % and to slowly adjust the dose during the fasting period according to the glucose metabolism.

Double administration of basal insulin should be distributed as follows: the usual morning dosage is administered with Iftar (sunset) and the evening dosage at a 50 % reduction should be administered with Sahur (sunrise) [38, 42].

Rapid or short-acting prandial/bolus insulin

The usual dosage is to be administered according to the carbohydrate source to Iftar. The administration of insulin at noon should be omitted. For Sahur, an initial dose reduction of 25 to 50 % is recommended and the dosage should be adjusted as needed. Func-

tional insulin therapy (FIT) can be derived from the above recommended dose adjustment of basal and prandial insulins.

Mixed insulin

For single administration: administer usual dosage with Iftar. For double administration: usual morning dosage with Iftar, reduce usual evening dosage by 25–50 % and administer with Sahur. In case of three administrations: skip midday dose, otherwise apply as recommended for two administrations and gradually adjust the dose. A dose titration (if necessary, according to a prescribed scheme) should be performed every three days according to the glucose value. Close monitoring or consultation with the doctor in charge or the diabetes team is recommended.

Insulin pump therapy

The basal rate should be reduced by 20–40 % in the last 3 to 4 h of fasting. Shortly after Iftar an increase of the basal dose by 0–30 % is recommended. The bolus dose should be administered depending on the carbohydrate amount consumed and the respective insulin sensitivity.

Breaking the Fast

Each patient should be informed about the possibility of breaking the fast. In particular, symptoms of hypoglycemia or hyperglycemia should be taken seriously and reacted to accordingly. In case of an unforeseeable event or an acute complication (e. g. acute illness, massive blood glucose derailment) the fasting should be interrupted immediately. Fasting can be ended by ingesting a liquid containing carbohydrates or with solid food.

In the case of hypoglycemia with typical symptoms, prompt glucose measurement is recommended after an appropriate intake of fast-acting carbohydrates.

In case of unclear symptoms of blood glucose derailment (unclear differentiation between hypoglycemia and hyperglycemia) and refusal to break the fast, immediate glucose measurement is recommended and should be reacted to according to the values listed below.

All patients should interrupt fasting when [38]:

1. The glucose value is < 70 mg/dl (3.9 mmol/l)
2. The glucose value is > 300 mg/dl (16.7 mmol/l) and/or
3. Symptoms of hypoglycemia or an acute illness have occurred.

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Conflict of Interest

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