Underwriting Type 2 Diabetes in China – Considering Both Insurance Product and Individual Health Factors

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The past 30 years have witnessed a significant increase in the prevalence of type 2 diabetes mellitus (T2DM) in China. A 1980 epidemiological survey that included 30,000 people from 14 provinces and cities indicated that the prevalence of diabetes was only 0.67%.

From 2007 to 2008, however, the Chinese Diabetes Society (CDS) performed an epidemiological survey in 14 provinces and cities. After adopting a weighted analysis that took into account factors such as gender, age, rural and urban distributions and regional differences, the estimated prevalence of diabetes was 9.7% in adults over 20 years of age, accounting for 92.4 million adults with diabetes (43.1 million rural residents and 49.3 million urban residents). A study in 2010, based on a nationally representative sample of 98,658 Chinese adults, was analysed using a complex multistage probability sampling design. The analysis estimated the prevalence of diabetes according to the 2010 American Diabetes Association criteria and found it to be 11.6%, with the prevalence of prediabetes at 50.1%. Projections based on this sample suggest that there are up to 113.9 million Chinese adults with diabetes and 493.4 million with prediabetes. These findings emphasise the importance of diabetes as a public health problem in China.

The current epidemic of diabetes in China shows the following characteristics:

1. T2DM accounts for more than 90% of the overall population with diabetes in China; type 1 diabetes mellitus (T1DM) accounts for approximately 5%, and other types of diabetes account for only 0.7%. Due to lack of reliable data on T1DM incidence and prevalence over the past years in China, further investigation has to be conducted.

2. The prevalence of diabetes appears to be correlated with the degree of economic development. In the 1994 survey, the prevalence of diabetes among the high-income group was two to three times higher than that of the low-income group.
A recent study showed that the prevalence of diabetes in developed regions was significantly higher than in under-developed regions, and the prevalence rate in cities was higher than in rural areas.7

3. A large proportion of diabetes is undiagnosed. In the 2007–2008 national survey among adult population over 20 years of age, patients with newly diagnosed diabetes accounted for 60% of total diabetes population.

4. Male gender and low-education levels are risk factors for diabetes. In the 2007–2008 survey, after adjusting for other risk factors, the risk for men was increased by 26% compared to that for women, and risk of diabetes among people without college education was 57% higher than for those with college or higher education.8

5. The average body mass index (BMI) of China’s T2DM population is approximately 25kg/m², whereas the average BMI of Caucasian diabetes population is generally higher than 30kg/m². In China there is a larger proportion characterized by postprandial hyperglycaemia, which alone accounts for nearly 50% of the overall newly diagnosed population.9

6. Cardiovascular diseases are common among diabetic patients. Because the diabetes population in China has a shorter disease duration, late chronic complications, such as diabetic retinopathy and nephropathy, may pose great challenges in the future.10

### Diabetes prevention in China

In China, T2DM prevention is composed of primary, secondary and tertiary levels:

- The goal of primary prevention is to prevent the occurrence of T2DM.
- Secondary prevention aims to prevent diabetic complications.
- Tertiary prevention aims to delay the progression of diabetic complications, to reduce morbidity and mortality and to improve the patients’ quality of life.11

The risk of T2DM depends primarily on the patient’s number and degree of risk factors, which could be divided into unchangeable risk factors and changeable risk factors:

<table>
<thead>
<tr>
<th>Unchangeable risk factors</th>
<th>Changeable risk factors</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age</td>
<td>Prediabetes (impaired glucose tolerance or combined impaired fasting glucose), the most important risk factor</td>
</tr>
<tr>
<td>Family history or genetic predisposition</td>
<td>Metabolic syndrome</td>
</tr>
<tr>
<td>Ethnicity</td>
<td>Overweight, obesity and depression</td>
</tr>
<tr>
<td>History of gestational diabetes mellitus (GDM) or women with history of delivery of a baby weighing ≥ 4kg</td>
<td>Excess dietary caloric intake, sedentary or physically inactive</td>
</tr>
<tr>
<td>Polycystic ovary syndrome</td>
<td>Use of drugs that can increase the risk of diabetes</td>
</tr>
<tr>
<td>Intrauterine growth retardation or premature birth</td>
<td>Social environments that can cause obesity or diabetes</td>
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In order to improve the primary prevention efforts for T2DM, hierarchical management approaches based on the differences between the high-risk population and general population should be adopted.

### What we cover in the product

Since the prevalence of T2DM has now reached epidemic proportions, we assume all the above epidemic characteristics also exist in the insurance population. Accordingly, living insurance benefits policies (such as Critical Illness and TPD) are an important option for those with DM or prediabetes.

In Asian markets, complications of diabetes compose the main part of the benefit of diabetic product. Since both type 1 and type 2 diabetes are predisposed to microvascular disease complications (retinopathy, nephropathy and neuropathy) and macrovascular disease complications (heart attack, stroke, peripheral vascular disease and gangrene),12 diabetic complications are usually covered as a special benefit in CI policies, which includes Diabetic retinopathy, Diabetic nephropathy, Limb amputation, heart attack and stroke. This special benefit commonly provides 5% - 20% of total sum assured. This design behaves like a minor benefit compared to those standard DM complications covered by CI product and, it is assumed, could be helpful in enhancing the CI product.
In the China market in recent years, we have discussed with clients a DM product that could be sold as an independent product rather than an additional benefit attached to a CI product. The market has a great interest in how to incorporate Health control into the product and how to incorporate the positive intervention result into the product. Possibilities include increasing the Sum Assured gradually or reducing the premium if the individual who is life assured demonstrates good adherence to the health control programme and has no claims (some products provide DM-related medical cost benefits) within a certain period.

**Underwriting**

In the next section, we discuss underwriting from both individual underwriting and DM product insured aspects. Some younger DM patients and individuals with prediabetes are affected by “tightening” diagnosis criteria, and the individual underwriting practice needs to be adjusted accordingly. Regarding the DM product insured, how to target the right person with persistent underwriting based on medical intervention protocol will be emphasized and discussed.

**Risk assessment**

The epidemic characteristics of diabetes in China as well as the prevention protocols are helpful in determining guidelines for offering insurance to individuals with diabetic risk factors and to diabetic patients and individuals with prediabetes.

Considering the population size in China, it is not regarded as feasible to screen the entirety for prediabetes or to systematically identify high-risk individuals by blood glucose tests alone throughout that entire population. Identification of those at high risk relies primarily on opportunistic screening (e.g. during routine physical examination or treatment for other conditions). Screening for diabetes benefits early diagnosis and improves the prevention and treatment of the disease and its complications. For insurers, screening of this high-risk group is achieved by identifying adults (≥18 years) with one or more of the following diabetes risk factors:

- Age≥40 years
- History of impaired glucose regulation
- Overweight (BMI 24 kg/m²) or obesity (BMI 28 kg/m²) and/or central obesity (male waist circumference 90 cm and female waist circumference ≥85 cm)
- Sedentary lifestyle
- First-degree relatives with T2DM
- Women who delivered a baby weighing 4 kg or were diagnosed with GDM
- Hypertension [systolic blood pressure ≥140 mmHg and/or diastolic blood pressure ≥90 mmHg (1 mmHg = 0.133 kpa)] or on therapy for hypertension
- Dyslipidemia [high-density lipoprotein cholesterol (HDL-c) ≤0.91 mmol/L (triglycerides 2.22 mmol/L (200 mg/dl) or on therapy for hyperlipidemia
- Atherosclerotic cardiovascular disease
- A transient history of steroid diabetes
- Polycystic ovary syndrome
- Long-term use of antipsychotics and/or antidepressant treatment

Of all the mentioned factors, impaired glucose regulation is the most important. Approximately 5% - 10% of patients with impaired glucose tolerance progress to T2DM annually.

**Defining risk profile of insured**

From a risk selection point of view, insurers need to consider how to apply the above screening criteria in a smart, user-friendly and risk selection-efficient way in order to identify ideal clients. Regarding
the health questionnaire, for example, which is more likely to encourage the insured to make an honest disclosure – a general question about past medical history, or a specific question that includes the measured figures of blood pressure? The information of age, gender, residence and the duration of DM could be easily collected at application stage, and the questions about family history and relevant medical history could be emphasized in the questionnaire. Considering the significant growth of online sales in the China market, tailor-made questionnaires are practicable and acceptable. We assume these specialised questions could help the underwriter collect credible information and meanwhile encourage the clients to disclose the truth because the more accurate the question’s wording is, the more exact answer could be expected.16

Persistent underwriting

Furthermore, diabetic clients’ health behaviour is also critical. Lack of compliance with medications, persistent smoking, weight gain over time, persistently high HbA1c, lipids or BP are all unfavourable features. Ideally, it will be helpful at the underwriting stage to have medical documents to confirm the clients’ compliance with lifestyle intervention and medications. As it is unavailable at underwriting stage, however, we need to be practical and consider the “Persistent Underwriting” course of action, which means the risk assessment should also continue after the policy is issued.

Weight control

According to the study funded by Diabetes UK, which aimed to assess whether intensive weight management within routine primary care would achieve remission of type 2 diabetes, the scientists found that at 12 months almost half of participants achieved remission to being non-diabetic and off antidiabetic drugs. They concluded that remission of type 2 diabetes is a realistic target for primary care.17

HbA1c

The American Diabetic Association recommends aiming to achieve normal or near normal glycaemia, recommending an HbA1c goal of <7%. More stringent goals (i.e., a normal HbA1c, <6.5%) can be considered in individual patients. Less stringent treatment goals (e.g., <8%) may be appropriate for older patients, those with a history of severe hypoglycemia, limited life expectancies, older adults and individuals with comorbid conditions. Reductions in HbA1c are closely correlated with reductions in microvascular complications and neuropathy. Previously, HbA1c was not widely used, but since being integrated into the diagnostic criteria for diabetes in American Diabetes Association (ADA) in its updated 2010 guidelines, this test has become available nationally.18 In 2011, the WHO also recommended that wherever conditions permit, countries and regions may consider adopting this HbA1c cut-off point for diabetes diagnosis.19 For the insurance industry, applying HbA1c as one major criteria of persistent underwriting is appropriate because it reflects the blood glucose control over three months. It is more predictable and less invasive than a fasting blood sugar.

Blood pressure control, lipid control and aspirin use

There is good clinical evidence that lowering blood pressure, lowering lipids, or the proper use of aspirin therapy alone or in combination, can reduce the risk of cardiovascular disease recurrence and death in patients with T2DM who have had cardiovascular disease.20 In patients with diabetic nephropathy, the use of blood pressure-lowering agents – particularly the use of angiotensin-converting enzyme inhibitor or angiotensin II receptor antagonist drugs – significantly reduces the risk of diabetic nephropathy progression.

Besides all of the above interventions, prevention and treatment of DM involves maintaining a healthy diet, regular physical exercise and avoiding the use of tobacco. Clinically, therefore,
the approach for cardiovascular risk reduction in type 2 diabetes appears to be multifactorial (glycemic control, stopping smoking, aggressive blood pressure control, treatment of dyslipidemia). By applying certain wearable devices and some new technologies, underwriters now have more solutions to collect all this useful information. We can foresee that the underwriter will be able to draw a precise risk profile of the client by professionally interpreting all these risk factors from information that new technology produces – provided he or she has enough knowledge of T2DM and its epidemic features.

Complications

Clinically, the ideal comprehensive control of T2DM varies according to the age, comorbidities and complications of patients. A treatment that does not achieve the control targets should not be viewed as a failure because any improvement in the control indicators confers benefits to the patient and reduces the risks associated with complications.

Cardiovascular disease, a more common cause of death in populations with diabetes than microvascular complications, is less clearly impacted by levels of hyperglycemia or the intensity of glycemic control. Tight glycemic control appears to protect against both microvascular and cardiovascular disease in type 1 diabetes and against microvascular disease in type 2 diabetes. However, its role in reducing cardiovascular risk has not been established as clearly for type 2 diabetes. Therefore, taking thorough consideration of epidemic features of the Chinese general population, it may be helpful to tailor a product to those people.

Conclusions

With the significantly increasing prevalence of T2DM as well as the absolute prevalence rate in the general population, T2DM can now be regarded as an epidemic disease in China. Living insurance benefit policies (such as Critical Illness and TPD) and medical products (hospitalisation reimbursement and certain DM-related treatment benefits) have been repeatedly discussed in our industry. Furthermore, for individuals with high diabetic risk, prediabetic patients and diabetic patients, updating the underwriting guidelines by taking into consideration medical treatment improvement and lifestyle intervention results is appropriate and should be implemented.

From an underwriting perspective, HbA1c, weight control, blood pressure and lipid control as well as the absence of smoking are important in predicting the risk of complications of T2DM. Therefore, getting the correct risk profile of individual clients, as well as targeting the correct insured group for the DM products, is challenging. To achieve these targets, applying a dynamic underwriting protocol (using the rewards of medical intervention, primary prevention efforts to screen individuals who are at high-risk of diabetes) and taking epidemic figures of T2DM in China into account in pricing, are two fundamental elements.

About the Author

Dr. Celia Zhang Ying is the Chief Underwriter for the Gen Re Life/Health Shanghai office. She is responsible for Gen Re’s underwriting assessment and medical research in mainland China. Celia joined Gen Re in 2004 and has been involved in various areas and projects. She has a particular focus on medical research and has published several papers individually or collaboratively in both company and industry publications. Celia is officially appointed by IAC (Insurance Association of China) as a Core Expert. She can be reached at Tel. +86 21-6100 6387 or yzhang@genre.com.
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Endnotes
3 Prevalence and Control of Diabetes in Chinese Adults; for the 2010 China No communicable Disease Surveillance Group.
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11 Ibid, Note 4.
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14 Ibid, Note 4.
17 Primary care-led weight management for remission of type 2 diabetes (DIRECT): an open-label, cluster-randomised trial. The LANCET; December 2017.