

Review article

The Status Quo in Health Risk Assessment of Chronic Diseases and Challenges Faced by China

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Abstract

As a key technology for chronic disease management, risk assessment plays an important role in chronic disease prevention and control. This paper aims to summarize the status quo in risk assessment of chronic disease in recent years in hope of providing guidance for chronic disease assessment in China.

Keywords: Challenges, Chronic diseases, Health risk assessment

Introduction

The mortality due to chronic diseases accounted for about 70% of the total deaths [1-3]. In 2012, deaths from chronic diseases accounted for 86.6% of the total deaths in China, higher than the global average over the same period [4]. Due to the slow onset and long incubation of the chronic disease, prevention and early intervention, which screen high-risk patients by studying the health risk factors, are recognized as effective ways to reduce the incidence. Health risk assessment, which aims to study the relationship of the risk factors with incidence and case fatality rate as well as the inherent laws, is a basic technology and the core for screening the patients with chronic disease.

The Status Quo in Chronic Disease Risk Assessment at Home and Abroad

In 1967, the National Institutes of Health of the United States established the Framingham risk model [5]. Risk factors for cardiovascular disease (CVD), including age, systolic blood pressure etc., were included in the model to predict the risk of coronary heart disease in the next 10 years of individual patients. Framingham model is a milestone in the history of chronic disease risk assessment, promoting the innovation of risk assessment technology. After a series of improvements [6-8], the prediction ability of the model has been further improved. Other common CVD assessment models include the National Cholesterol Education Program Adult Treatment Panel III (NCEP-ATP III) [9]; QRISK risk score [10]; Reynolds Risk Score [11]; ischemic cardiovascular disease (ICVD) risk assessment in China [12]; and Chinese CMCS model [8].

Based on 2 large cohort studies, the Harvard Cancer Risk Index Working Group developed a risk assessment tool for cancers, which can be used to assess the risk of cancer in the population aged over 40 [13]. This method is simple, fast and widely accepted. In addition, Gail Model [14], as a comparatively accurate breast cancer assessment model, can assess the risk of breast cancer within 5 years or throughout

the life of an individual patient, and is widely used in clinical practice [15]. In 2018, based on Framingham model, Southwest Hospital in Chongqing, China, developed a risk assessment model for asymptomatic cancer which integrates cancer statistics in 2015 and 2018 in China, and the data on chronic disease risk assessment and standardization project of preventive medicine. Currently the model is in clinical trial.

Over the past 50 years, remarkable progress has been made in the prevention of chronic disease by risk assessment: the mortality rate of chronic disease has been significantly reduced in many countries worldwide [16]. Since the 1980s, China has gradually built ICVD risk assessment and CMCS model [8,12], a lifetime risk assessment model for cardiovascular disease and stroke [17,18] and China-PAR model [19-21], which conformed with the national situation. However, most of the existing risk assessment models in China lack external validation, and thus the application of the models is limited [22]. As for early screening for cancer, many expert consensus have been reached [23-25], but the risk assessment model based on multiple risk factors is still in the pilot stage.

The Challenges with Health Risk Assessment in China

1. There is a lack of high-quality data. Large cohort studies are an important source of high-quality data; At present, there are China kadoorie biobank (CKB) and prospective follow-up studies on factors impacting development of cardiovascular disease and its mortality, but they are still in early phase.
2. The standards for health data have not been unified. Basic data for health risk assessment may come from diversified sources, such as smart watches and wearable devices etc. However, the standards of health management data have not been developed to meet the real needs in China.
3. The modeling method is not innovative enough. The main risk factors included were lifestyle-related and metabolic

risk factors [26], such as smoking and BMI, while other factors, including the time sequence of chronic diseases [27], characteristics of disease evolution in population [28], environmental factors and social determinants, have not been considered [29]. In addition, support vector machine [22], classification and regression tree etc. are less frequently used.

- Promotion is limited. There is a lack of a sound health education system for chronic diseases, the public have limited knowledge about chronic diseases, their attitude towards chronic disease risk assessment is ambiguous, and the compliance is not high.

Competing Interests Statement

The authors declare that they have no conflicts of interest.

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