

# Non-pharmacological interventions for prevention and treatment of non-communicable diseases with experiences from China

*Non-pharmacological interventions for prevention of non-communicable diseases are undervalued, and clinicians and policy makers need to be more active in implementing them, say Hongbing Shen and colleagues*

**N**on-communicable diseases tend to be of long duration and are the result of a combination of genetic, physiological, environmental, and behavioural factors. Non-communicable diseases take an immense and increasing toll on lives, livelihoods, health systems, communities, economies, and societies.<sup>1</sup> Pharmacological interventions use drugs for the prevention and treatment of diseases. However, overdiagnosis and overtreatment of non-communicable diseases, and related over-reliance on and overuse of drugs and medical devices, are important contributors to the high burden

of non-communicable diseases.<sup>1,2</sup> Risk factor reduction is an important strategy to control non-communicable diseases. Non-pharmacological interventions are science based, non-invasive interventions for human health that include lifestyle modification, psychological adjustment, and self-management education for patients.<sup>3</sup> Effective non-pharmacological interventions can prevent and control non-communicable diseases and reduce their burden, as evidenced by the successful practices of many countries, including China. However, the complementary relation between non-pharmacological interventions and drugs is still not widely recognised and applied in clinical practice, and the effectiveness of non-pharmacological interventions against non-communicable diseases is often underestimated and underappreciated by patients and clinicians.

## Non-pharmacological interventions are important for prevention and treatment of non-communicable diseases

Non-communicable diseases are commonly known as chronic or lifestyle related diseases.<sup>1,4</sup> Non-pharmacological interventions could reduce the incidence of and mortality from the major non-communicable diseases, thereby increasing life expectancy.<sup>1,4,5</sup> Long term, well organised non-pharmacological intervention initiatives and promotion around the world, such as the North Karelia Project, the UK nationwide salt reduction programme, the Da Qing Study, and the Shandong-Ministry of Health Action on Salt and Hypertension programme in China, have provided evidence of long term benefit from non-pharmacological interventions in the prevention and control of diabetes and cardiovascular diseases. The China Motivational Healthy Walking Programme explored a real world model of physical activity promotion suitable for working

age people and found positive effects of walking for reducing body mass index and waist circumference and preventing overweight and obesity.<sup>6</sup> Increasing the adoption of healthy lifestyles could also reduce overall risk of cancer.<sup>1,7</sup> One study suggested that among participants at high genetic risk, the standardised five year incidence of cancer was relatively lower for people with a favourable lifestyle than for those with an unfavourable lifestyle, irrespective of the gender.<sup>7</sup>

Non-pharmacological interventions can improve clinical outcomes and quality of life in people with non-communicable diseases. Non-pharmacological interventions such as smoking cessation, nutritional supplementation, breathing exercises, and inhaler training had positive effects on survival and quality of life in patients with chronic obstructive pulmonary disease.<sup>8,9</sup> Clinicians who accept training on lifestyle intervention and combine it with drug treatment can improve the effect of their treatment and management of non-communicable diseases. Furthermore, this approach could help clinicians to enhance their reputation or avoid some misunderstandings or misinterpretations of clinical treatment processes. For example, trained village doctors were shown to improve blood pressure control in Chinese rural residents by combining antihypertensive drugs with health coaching on home blood pressure monitoring, lifestyle change, and drug adherence.<sup>10</sup> An evaluation of a nationwide diabetes prevention programme suggested that promoting lifestyle advice and counselling in routine care at scale in a national health system can achieve important health improvements.<sup>11</sup> Adding non-pharmacological interventions to guidelines on the prevention and treatment of non-communicable diseases, and promoting training on non-pharmacological interventions for

## KEY MESSAGES

- Non-pharmacological interventions can make important contributions to the prevention and control of non-communicable diseases
- Non-pharmacological interventions can improve clinical outcomes in patients with non-communicable diseases, making clinicians' work more effective and cost effective and improving their reputation among patients
- Pharmacological interventions and non-pharmacological interventions for prevention and treatment of non-communicable diseases are complementary, not antagonistic
- Non-pharmacological interventions, particularly lifestyle targeted interventions, should be given greater emphasis
- Long term, well organised non-pharmacological intervention initiatives and promotion of healthy lifestyles have been shown to be achievable and effective in studies in different countries around the world, including China

clinicians and primary health practitioners, is therefore beneficial.

#### **Pharmacological interventions and non-pharmacological interventions are complementary, not antagonistic**

Both pharmacological and non-pharmacological interventions can and should be used for primary prevention of non-communicable diseases. Drugs have been shown to be effective in reducing the risk of non-communicable diseases. A study showed that all cause mortality was reduced after five years of statin treatment (hazard ratio 0.87, 95% confidence interval 0.80 to 0.94), attributable mainly to a 21% decrease in death from cardiovascular disease (0.79, 0.69 to 0.90), with improved survival and a substantial reduction in cardiovascular disease outcomes over a 20 year period, and supported wider adoption of this primary prevention strategy.<sup>12</sup> Pharmacological interventions often quickly and effectively help to manage medical conditions and progression of non-communicable diseases, avoiding acute health damage and even death. Owing to poor adherence, unavailability and unaffordability, and low cost effectiveness, the widespread use of some effective drugs has been limited. The World Health Organization reported that approximately four out of every five people with hypertension are not adequately treated, but 76 million deaths could be averted between 2023 and 2050 if countries can scale up coverage.<sup>13</sup> Drugs and medical devices also pose a significant financial burden to the healthcare system and patients that can impair wellbeing and quality of life.<sup>14</sup> Drugs may not always treat the underlying cause of a condition and may provide only temporary relief of symptoms. Adverse events due to drugs for non-communicable diseases are commonly observed, and some are serious. Although a concerning underuse of some preventive drugs for non-communicable diseases exists (for example, antiplatelet agents, antihypertensives), long term, excessive emphasis on other pharmacological interventions can lead to an increased risk of side effects, drug interactions, and development of drug resistance.<sup>15</sup> Therefore, prevention and treatment of non-communicable diseases should not be over-reliant on drugs and medical devices, especially when mechanisms or therapeutic targets are not fully understood or the efficacy of these treatments is not robustly determined.

For some non-communicable diseases, non-pharmacological interventions may be first line preferences for prevention and treatment, with drugs added only if necessary. Non-pharmacological interventions alone may be effective enough to preclude the need for drugs in many cases. Primary care led weight management, in the absence of antidiabetic and antihypertensive drugs, was found to achieve remission of diabetes in 42% of patients (with odds ratios of remission as high as 19.7).<sup>16</sup> Non-pharmacological interventions can help to reduce daily doses of antihypertensive drugs and delay progression from pre-hypertension to hypertension.<sup>17</sup> Obviously, pharmacological interventions and non-pharmacological interventions are not antagonistic but complementary. Pharmacological interventions may be the top choice for treatment of some non-communicable diseases at certain stages, but a combination of pharmacological and non-pharmacological interventions may achieve the best outcomes.<sup>18</sup> Furthermore, implementing non-pharmacological interventions that are backed with scientific evidence can improve quality of life, slow deterioration, relieve pain, or restore the health of patients with non-communicable diseases, usually at lower cost.

#### **Non-pharmacological interventions should be given more emphasis**

Non-pharmacological interventions underpin public health approaches to modification of risk factors for non-communicable diseases. However, these interventions aimed at reducing major risk factors for non-communicable diseases have not received as much attention or funding as pharmacological interventions. This inattention may be due to underestimation and underappreciation of the effectiveness of non-pharmacological interventions.<sup>19 20</sup> Non-pharmacological interventions have often not been well implemented owing to obstacles to inter-professional collaboration or inadequate resources.<sup>21</sup> In some instances, medical staff have insufficient knowledge of non-pharmacological interventions.<sup>22</sup> Some physicians and nurses remain unconvinced of the effectiveness of non-pharmacological interventions or have unfavourable attitudes, despite an expanding base of scientific evidence.<sup>19 20</sup> Furthermore, several studies suggest that patients tend to prefer pharmacological interventions and are generally not interested in non-pharmacological interventions such as

exercise and smoking cessation.<sup>20</sup> Non-pharmacological interventions seem to be under-embraced globally by both patients and clinicians.

Other non-pharmacological interventions may be effective, but non-comparable definitions, methodological problems, and lack of standardised assessment practices challenge valid assessment of their effectiveness and limit the practical value of much existing evidence.<sup>23 24</sup> Fortunately, the latest 5×5 framework for prevention and control of non-communicable diseases identified five main risk factors—unhealthy diet, tobacco use, air pollution, harmful use of alcohol, and physical inactivity—and suggested that non-pharmacological interventions are the most reliable and effective means for prevention of non-communicable diseases. Successful practices such as those used in the Da Qing Study provide compelling evidence of the effectiveness of lifestyle interventions, but unfortunately lifestyle intervention has not been effectively implemented in routine clinical practice in some areas.<sup>5</sup> Non-pharmacological interventions should be given greater emphasis, particularly lifestyle targeted interventions.

#### **Challenges of implementation of non-pharmacological interventions and corresponding effort**

Long term, well organised implementation of non-pharmacological interventions in large populations is achievable and can improve population lifestyles and physiological indicators and reduce the risk and burden of non-communicable diseases. Only by ensuring accessibility, generalisability, and sustainability of the interventions can they be truly and effectively used for promoting the health of the population. Solving these challenges requires technical support tools with high level mobilisation and multi-departmental cooperation. WHO has provided and promoted several high impact, evidence based technical packages for non-pharmacological intervention in recent years, and nutrition and physical activity related US guidelines have also been developed and widely referenced by other countries.<sup>25</sup> Non-pharmacological intervention related strategies such as the WHO global action plan on physical activity (2018-30), USA Healthy People 2030 plan, and EU4Health programme (2021-27) aim to promote the sustainability of and multi-departmental cooperation on health promotion interventions. Technical

guidelines for non-pharmacological interventions have also recently been developed and promoted in China, such as Dietary Guidelines for Chinese Residents (2022), Physical Activity Guidelines for Chinese Residents (2021), and national guidelines for the prevention and treatment of non-communicable diseases.<sup>7</sup> The Healthy China Initiative (2019-30) was launched as a national strategy in 2019, starting a decade of national disease prevention and health promotion actions, with 15 specific campaigns to improve factors that influence health, protect health across the full life cycle, and prevent and control major diseases.

### Relying solely on medical staff is not enough—trained personnel can play an important role in implementation

Only medical staff can prescribe drugs and implement pharmacological interventions, but use of non-pharmacological interventions is not restricted to these professionals; such interventions can also be conducted by volunteers and other types of personnel. The number of non-communicable diseases and high risk groups is extremely large, and reliance on medical staff to implement non-pharmacological interventions for prevention and management in this large population is not enough—the support of other personnel is needed. Health volunteers such as trained community workers and school teachers with professional knowledge and skills can do health consultations, provide lifestyle guidance, and conduct other non-pharmacological intervention related work. Healthy lifestyle instructors, nutrition instructors, and sports instructors have been widely recruited and trained in China. They provide healthy lifestyle services such as education about diet, exercise, and psychological health in communities and primary healthcare institutions. China's Medium-to-Long Term Plan for the Prevention and Treatment of Chronic Diseases (2017-25) and Healthy China Initiative (2019-30) promote teams of such qualified personnel. The efforts of these non-clinician personnel can support clinicians in their effort to improve the quality of life of patients with non-communicable diseases and help to enhance adherence to clinical treatments.

### Conclusions

Non-pharmacological interventions are fundamental for the prevention and control of non-communicable diseases. Although

rapid development of technology has made treatment of non-communicable diseases with drugs more precise, the current situation of emphasising pharmacological interventions over non-pharmacological interventions has been associated with drastically increasing burdens of non-communicable diseases and adverse effects of drugs that cannot be ignored. Long term, well organised implementation of non-pharmacological interventions in large populations is both achievable and effective. Provision of appropriate technical tools, policy support, and qualified personnel, as well as increased awareness of non-pharmacological interventions in relevant populations, are needed to promote a wider adoption and implementation of non-pharmacological interventions. Only by fully recognising the importance of non-pharmacological interventions can we implement comprehensive strategies for the prevention and reduction of non-communicable diseases. Non-pharmacological interventions should be widely embraced by populations at high risk of non-communicable diseases and by patients, clinicians, policy makers, and the public across the world. Appropriate non-pharmacological interventions should be incorporated into international guidelines and protocols for prevention and treatment of non-communicable diseases and fully applied in clinical practice. More quantitative studies and evaluations of non-pharmacological interventions in clinical practice should be conducted to strengthen assessment of their effectiveness and acceptance.

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- 1 World Health Organization. Noncommunicable diseases. 2023. <https://www.who.int/news-room/fact-sheets/detail/noncommunicable-diseases>
- 2 Centers for Disease Control and Prevention. Health and Economic Costs of Chronic Diseases. 2023 <https://www.cdc.gov/chronicdisease/about/costs/index.htm>
- 3 Ninot G, Agier S, Bacon S, et al, LaPlateforme CEPS: Une structure universitaire de réflexion sur l'évaluation des interventions non médicamenteuses (INM). *Hegel* 2017;1:53-6.
- 4 Li Y, Pan A, Wang DD, et al, Impact of healthy lifestyle factors on life expectancies in the US Population. *Circulation* 2018;138:345-55. doi:10.1161/CIRCULATIONAHA.117.032047
- 5 Gong Q, Zhang P, Wang J, et al, Da Qing Diabetes Prevention Study Group. Morbidity and mortality after lifestyle intervention for people with impaired glucose tolerance: 30-year results of the Da Qing Diabetes Prevention Outcome Study. *Lancet Diabetes Endocrinol* 2019;7:452-61. doi:10.1016/S2213-8587(19)30093-2
- 6 Li YC, Zhao YF, Yang XZ, Li ZX, Jiang W. [Effects of short-term intervention of walking on body mass index, waist circumference, and related indicators of working population]. *Zhonghua Yu Fang Yi Xue Za Zhi* 2019;53:212-7.
- 7 Zhu M, Wang T, Huang Y, et al, Genetic Risk for Overall Cancer and the Benefit of Adherence to a Healthy Lifestyle. *Cancer Res* 2021;81:4618-27. doi:10.1158/0008-5472.CAN-21-0836
- 8 Zysman M, Mahay G, Guibert N, Barnig C, Leroy S, Guilleminault L. Impact of pharmacological and non-pharmacological interventions on mortality in chronic obstructive pulmonary disease (COPD) patients. *Respir Med Res* 2023;84:101035. doi:10.1016/j.resmer.2023.101035
- 9 Ceyhan Y, Tekinsoy Kartın P. The effects of breathing exercises and inhaler training in patients with COPD on the severity of dyspnea and life quality: a randomized controlled trial. *Trials* 2022;23:707. doi:10.1186/s13063-022-06603-3
- 10 Sun Y, Mu J, Wang DW, et al, CRHCP Study Group. A village doctor-led multifaceted intervention for blood pressure control in rural China: an open, cluster randomised trial. *Lancet* 2022;399:1964-75. doi:10.1016/S0140-6736(22)00325-7
- 11 Lemp JM, Bommer C, Xie M, et al, Quasi-experimental evaluation of a nationwide diabetes prevention programme. *Nature* 2023;624:138-44. doi:10.1038/s41586-023-06756-4
- 12 Ford I, Murray H, McCowan C, Packard CJ. Long-term safety and efficacy of lowering low-density lipoprotein cholesterol with statin therapy: 20-year follow-up of west of Scotland coronary prevention



- study. *Circulation* 2016;133:1073-80. doi:10.1161/CIRCULATIONAHA.115.019014
- 13 World Health Organization. Global report on hypertension: the race against a silent killer. 2023. <https://www.who.int/publications/i/item/9789240081062>
  - 14 Pisu M, Martin MY. Financial toxicity: a common problem affecting patient care and health. *Nat Rev Dis Primers* 2022;8:7. doi:10.1038/s41572-022-00341-1
  - 15 De Crescenzo F, D'Alò GL, Ostinelli EG, et al, Comparative effects of pharmacological interventions for the acute and long-term management of insomnia disorder in adults: a systematic review and network meta-analysis. *Lancet* 2022;400:170-84. doi:10.1016/S0140-6736(22)00878-9
  - 16 Lean ME, Leslie WS, Barnes AC, et al, Primary care-led weight management for remission of type 2 diabetes (DiRECT): an open-label, cluster-randomised trial. *Lancet* 2018;391:541-51. doi:10.1016/S0140-6736(17)33102-1
  - 17 Mahmood S, Shah KU, Khan TM, et al, Non-pharmacological management of hypertension: in the light of current research. *Ir J Med Sci* 2019;188:437-52. doi:10.1007/s11845-018-1889-8
  - 18 Lu Q, Zhang Y, Geng T, et al, Association of lifestyle factors and antihypertensive medication use with risk of all-cause and cause-specific mortality among adults with hypertension in China. *JAMA Netw Open* 2022;5:e2146118. doi:10.1001/jamanetworkopen.2021.46118
  - 19 Leemans G, Vissers D, Ides K, Van Royen P. Perspectives and Attitudes of General Practitioners Towards Pharmacological and Non-Pharmacological COPD Management in a Belgian Primary Care Setting: A Qualitative Study. *Int J Chron Obstruct Pulmon Dis* 2023;18:2105-15. doi:10.2147/COPD.S423279
  - 20 Šedová L, Tóthová V, Olišarová V, et al, Opinions regarding the effectiveness of non-pharmacological measures in prevention of cardiovascular disease in the Czech Republic. *Neuro Endocrinol Lett* 2016;37(suppl 2):32-8.
  - 21 Cipriani A, Furukawa TA, Salanti G, et al, Comparative efficacy and acceptability of 21 antidepressant drugs for the acute treatment of adults with major depressive disorder: a systematic review and network meta-analysis. *Lancet* 2018;391:1357-66. doi:10.1016/S0140-6736(17)32802-7
  - 22 Cohen-Mansfield J, Jensen B, Resnick B, Norris M. Knowledge of and attitudes toward nonpharmacological interventions for treatment of behavior symptoms associated with dementia: a comparison of physicians, psychologists, and nurse practitioners. *Gerontologist* 2012;52:34-45. doi:10.1093/geront/gnr081
  - 23 Abbraha I, Rimland JM, Trotta FM, et al, Systematic review of systematic reviews of non-pharmacological interventions to treat behavioural disturbances in older patients with dementia. The SENATOR-OnTop series. *BMJ Open* 2017;7:e012759. doi:10.1136/bmjopen-2016-012759
  - 24 Grol R, Grimshaw J. From best evidence to best practice: effective implementation of change in patients' care. *Lancet* 2003;362:1225-30. doi:10.1016/S0140-6736(03)14546-1
  - 25 World Health Organization. Global Hearts Initiative, working together to promote cardiovascular health. 2016. <https://www.who.int/news/item/15-09-2016-global-hearts-initiative>

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