UK-China health and economy partnership workshop

中英健康与经济合作研讨会

We are delighted to present this report on the recent UK-CHEP masterclass hosted by the University of Zhejiang in China and the University of Leeds. The three day masterclass entitled 'Health Economics of Diagnostic Tests and Screening Programmes' and held at Zhejiang on March 23rd – 25th 2021 – shared area of interest and expertise for both health economics units.

The masterclass focussed on exploring the key and challenging health economic arguments surrounding the implementation of diagnostic tools and screening programmes, demonstrating how concepts of sensitivity and specificity and prevalence fit within the internationally recognised economic evaluation framework used for more traditional treatments.

23 – 25 March 2021
Zhejiang University
Online throughout China and the UK

BRITISH COUNCIL · gsk · BU Bournemouth University

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The UK-China Health and Economy Partnership (UK-CHEP) between UK and Chinese universities focuses on the economics of healthcare for the mutual benefit of the two countries.

The partnership aims to create long-term, sustainable collaboration in health economics, which will give UK and Chinese academics the means to work together on world-class educational and research outcomes that would otherwise not be possible working in isolation.

This partnership was originally launched in Jinan, Shandong province in November 2017 by Bournemouth University. GlaxoSmithKline and the British Council have extended the partnership for a further two years, from January 2019.

GlaxoSmithKline (GSK) assisted in the development of the partnership and has provided funding to ensure its success. The current partnership consists of the universities of Leeds, Sheffield, Bournemouth and York on the UK side and Zhejiang, Fudan and Shandong from China.

“It’s a great opportunity for us to learn from our UK counterparts about theories, methodologies and mechanisms of pharmacoeconomics.

Professor Hengjin Dong, Professor in Health Policy and Health Economics, Zhejiang University

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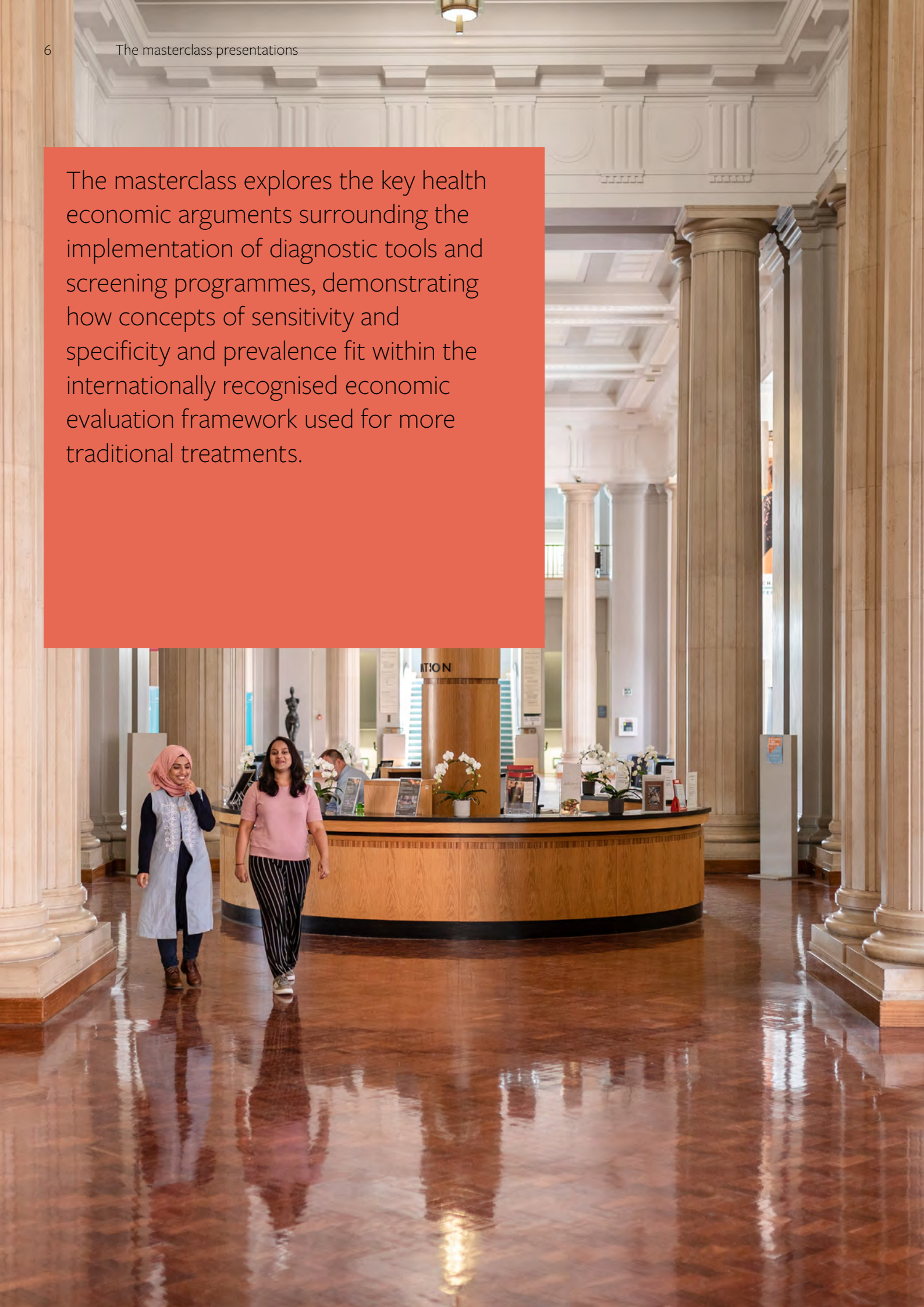
Source: Zhao Qiang, courtesy of UAD – The Architectural Design & Research Institute of Zhejiang University

This cooperative work and programme will further strengthen the collaboration between UK and Chinese universities in the areas of health and health economics, especially in the areas of exchanging ideas and experience in the studies of health technology assessment and their application on the health policies. I believe this work will also contribute to the overall collaboration in the areas of health and economic development between our universities.

Professor Hengjin Dong, Professor in Health Policy and Health Economics, Zhejiang University

The masterclass explores the key health economic arguments surrounding the implementation of diagnostic tools and screening programmes, demonstrating how concepts of sensitivity and specificity and prevalence fit within the internationally recognised economic evaluation framework used for more traditional treatments.



The masterclass presentations

Presentations were given by leading world experts in health economics and diagnostic and screening evaluation methodologies and supplemented with other key presentations on major topics relevant to China. Sessions were chaired by partnership leads, Professors Hengjin Dong (Zhejiang University) and Chris Bojke (University of Leeds). Content was bookmarked by welcome speeches delivered by Professor Darrin Baines of Bournemouth, Ms Gill Caldicott, Director of the British council East China region and Jenny Wu, GlaxoSmithKline (China). The masterclass concluded with a lively discussion on the current best practice for diagnostic test evaluation in China and UK and identification of the next set of challenges to face.

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The underlying problem is an infinite demand for healthcare, with a finite amount of resources with which to provide healthcare. This is the 'classic' rationale for economics – the science of scarcity:

- **A scientific approach to maximising 'outcomes' given limited resources**
- **Still means difficult decisions need to be made, but makes them explicit**
- **A pragmatic approach to making better decisions!**

Introduction to the economic evaluation of tests

Professor Chris Bojke
University of Leeds

Professor Bojke is the University of Leeds UK lead for the UK-CHEP. He is a professor in economic evaluation and health technology assessment methods with a speciality using Real World Data. Chris currently leads the Academic Unit of Health Economics at Leeds and is interim deputy chair of the NICE Public Health Advisory Committee B.

Learning objectives

- Health economics aims to ensure that new interventions (drugs, tests) are funded only if the expected benefits are greater than the opportunity cost of spending.
- Economic evaluation (EE) is the comparative analysis of alternative courses of action in terms of both their costs and health outcomes.
- Decision trees and markov cohort models are often used to evaluate cost-effectiveness of tests.
- Why are Tests / Screening different and how can we fit them into existing models

Choice across 10 pharmacologic combination strategies for type 2 diabetes: a cost-effectiveness analysis

Professor Shuyan Gu
Nanjing University

Professor Gu specialises in health economics, health technology assessment, health behaviour and quality of life assessment. She has published ten articles as first author in international journal such as BMC Medicine, Diabetes Obesity & Metabolism, Pharmacoeconomics, Quality of Life Research, etc., and is currently working in School of Government, Nanjing University.

- Type 2 diabetes imposes a heavy disease burden on patients and the healthcare system (116 million adults, diabetes-related health expenditure $109 billion)
- How to reduce medical costs and improve health has become a common concern
- A number of glucose-lowering drugs are available
- Medication adherence is poor in China (32% alter regimens in 1 year)
- Lack of understanding of efficacy, safety and costs of the existing treatments is a reason for the failure to choose a suitable treatment
- T2DM treatment often requires a sequential use of drug monotherapy and a combination of drugs to ensure intensive glycemic control
- It is of value to conduct economic evaluations based on a lifelong treatment strategy
- There is a lack of clinical or economic studies that directly compare all the existing lifelong treatment strategies within one study

The objective is to estimate and compare the lifetime cost-effectiveness of 10 commonly -used pharmacologic combination strategies for patients with newly diagnosed T2DM in China.

Screening could identify the pre-cancerous lesions and early stage of the EC , so could improve the rate of early diagnosis and treatment, and improve the five-year survival rate and health quality. The cost-effectiveness of screening are varied among different age groups, the younger had more benefit of cost-effectiveness.

Modeling the cost-effectiveness of esophageal cancer screening in china

Professor Hengjin Dong
Zhejiang University

Professor Dong is the Zhejiang University China lead for the UK-CHEP. He is a professor in health technology assessment and health economics. Professor Dong is also the director of Centre for Health Policy Studies in ZJU and member of the editorial board of PharmacoEconomics, Section Editor of BMC Health Services Research.

Background

- Esophageal cancer (EC) is a severe tumor with an estimated 806,300 prevalence, 472,500 new cases, and 436,000 deaths in 2017. It ranked as the 9th most common incident cancer and the 6th leading cause of death worldwide
- Over half of the worldwide incidence rate happened in China, with an estimated 286,700 new cases and 210, 900 deaths in 2012
- The incidence was 21.17/10^5, and mortality was 15.58/10^5 in 2013 in China. It was the 5th most common incident cancer and the 4th leading cause of death in China
- The overall 5-year survival was ~ 15%-20%
- Over 70% of EC patients had progressed to the invasive stage at the time of diagnosis due to its asymptomatic nature in the early stage

Thinking beyond accuracy

Dr. Bethany Shinkins
University of Leeds

Dr. Shinkins is an Associate Professor of Health Economics in the Academic Unit of Health Economics at the University of Leeds. She leads the Test Evaluation Group, a multi-disciplinary team that focuses on the economic evaluation of medical tests. She is a statistician by background and now works as both a statistician and health economist. Bethany joined the University of Leeds in 2015 as a Lecturer in Health Economics.

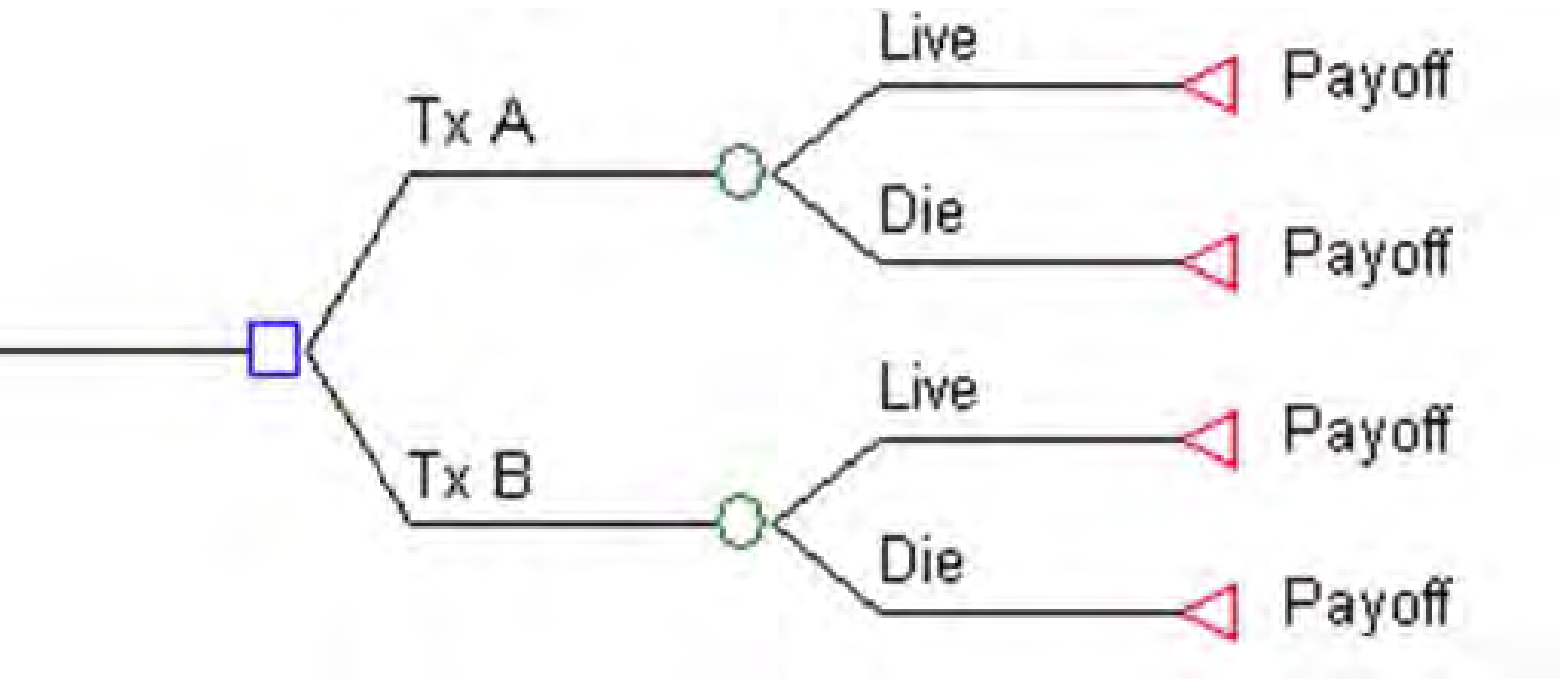
An accurate test may not improve outcomes

- Test result is too slow to change management
- Test result doesn't make it back to the ordering physician
- Patient is already too sick/too healthy for the test result to matter
- Test is performed inappropriately
- Result of test is acted upon inappropriately
- The test in question is only one of many tests ordered
- Treatment is not available (too expensive, out of stock, etc.)
- Treatment is not delivered
- Patient declines the treatment

Conclusions

- Decision analytic modelling provides a useful framework for linking diagnostic accuracy data to evidence on downstream costs and patient outcomes
- These models are sensitive to the assumptions made when linking the data
- Capturing the implications of FNs and FPs can be challenging may involve specific studies
- It's important to capture possible harms (e.g. overdiagnosis)

Accuracy is a key component of test evaluation, but we are mainly interested in the impact that tests have on patient outcomes (clinical utility). Modelling the downstream consequences of tests is essential to capture clinical utility. Linking decision trees to Markov models is a common technique used to link test results to their impact on long term costs and outcomes.



Diagnostic accuracy measures, together with prevalence, can be used within decision tree models to model intermediate outcomes. An example decision tree model is provided above to illustrate the key concepts.

Decision analytic models for tests – decision trees

Dr. Alison Smith
University of Leeds

Dr Smith is a Lecturer in Health Economics and a member of the TEG at the University of Leeds. Alison recently finished her PhD, in which she explored the role of test measurement uncertainty (bias and imprecision) on the clinical and cost-effectiveness of testing strategies. She sits on the NIHR Leeds In Vitro Diagnostics Co-operative, and is an expert member of the European Federation

Decision tree models

- A decision tree utilizes a flow diagram to show the logical structure of the problem
- Think of time flowing from left to right, with each of the branches depicting the possible patient pathways, contingent on particular events.

Diagnostic accuracy and prevalence data can be used to:

- Construct simple decision tree models
- Together with cost and QALY data, cost-effectiveness results can be produced
- Long term outcomes can also be modelled by linking the intermediate diagnostic outcomes to long term treatment outcomes using a Markov model

Measures of diagnostic accuracy

Dr. Alison Smith
University of Leeds

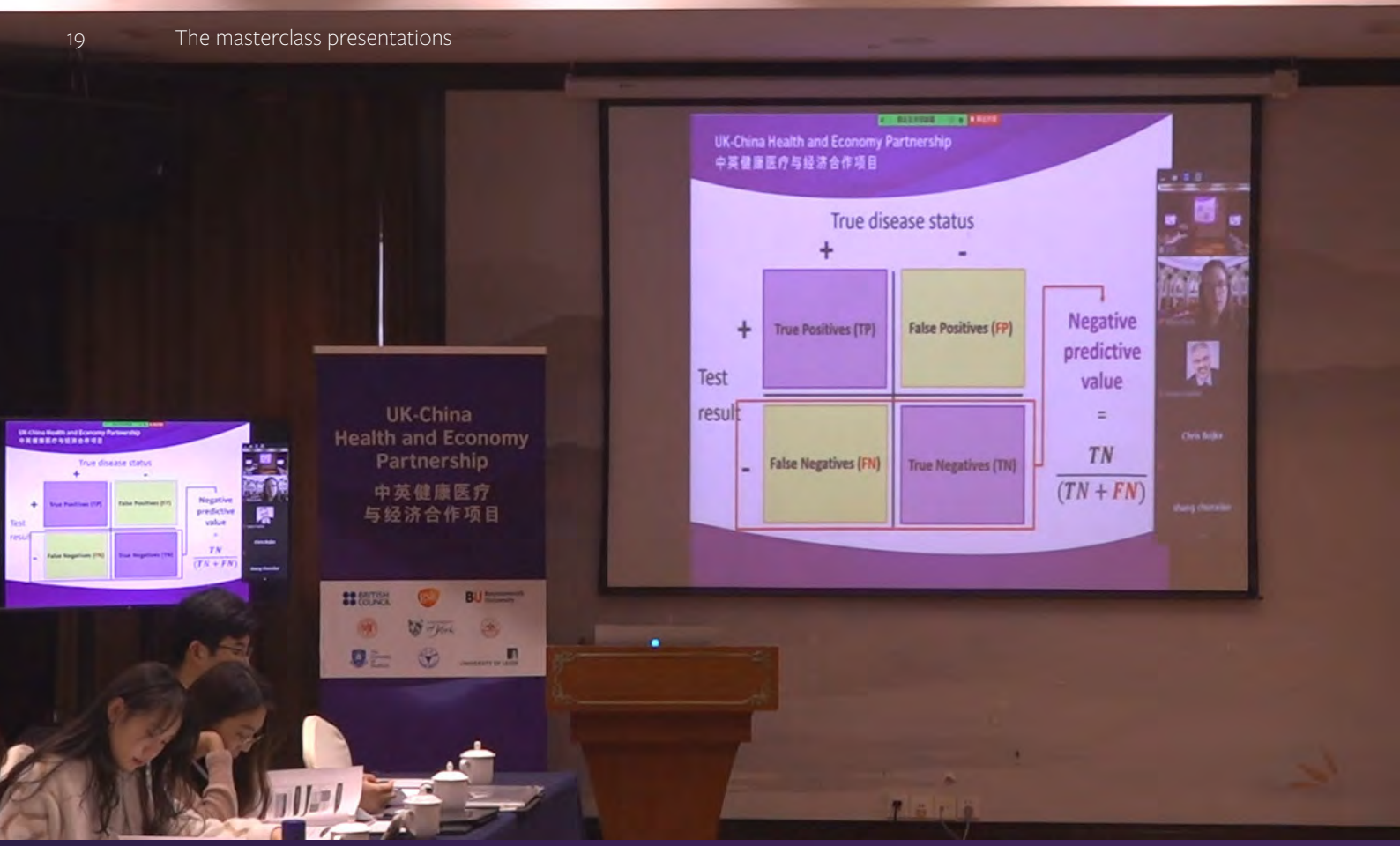
Dr Smith is a Lecturer in Health Economics and a member of the TEG at the University of Leeds. Alison recently finished her PhD, in which she explored the role of test measurement uncertainty (bias and imprecision) on the clinical and cost-effectiveness of testing strategies. She sits on the NIHR Leeds In Vitro Diagnostics Co-operative, and is an expert member of the European Federation of Clinical Chemistry and Laboratory Medicine (EFLM) Test Evaluation Working Group.

Learning objectives

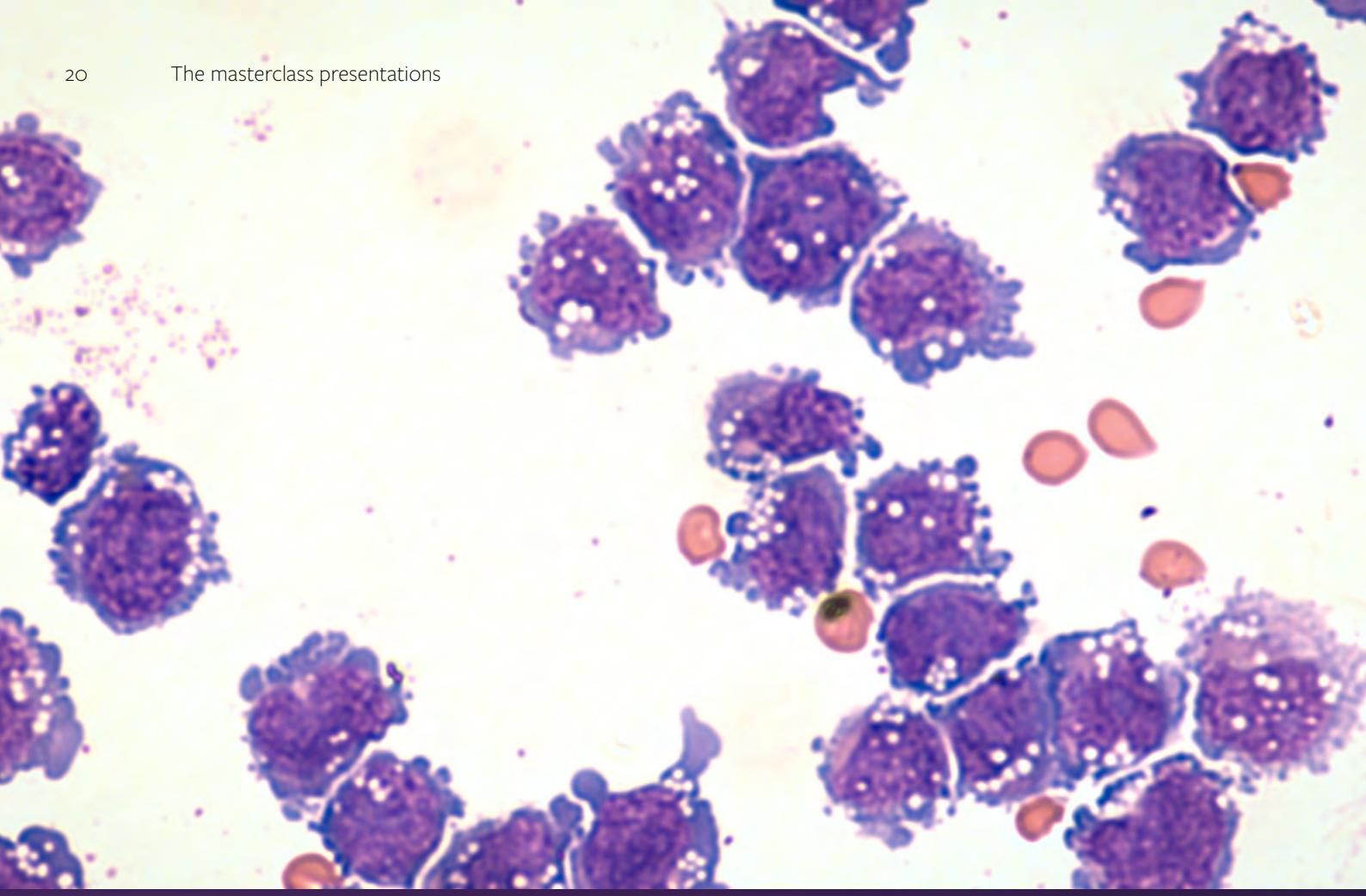
- Measures of diagnostic accuracy tell you how well the test can classify individuals with or without a particular disease
- Key diagnostic accuracy measures are derived from a 2 x 2 table, which compares true disease status with test results

True disease status

- To evaluate the diagnostic accuracy of a test, we need to compare the test results to the 'truth'
- Gold Standard: the best test/method we have available for determining the disease status of an individual
- Reference standard: the best test we have available to estimate an individual's disease status



Diagnostic accuracy values can be calculated from the 2x2 table. Sensitivity and specificity consider the accuracy of a test from the perspective of patients with the disease (sensitivity) and without the disease (specificity). PPV and NPV consider the accuracy of a test from the perspective of patients with a positive test result (PPV) or negative test result (NPV).



ALL is the most common form of childhood cancer. There are over 3,000 new cases of ALL diagnosed in children and adolescents (ages 0-19) each year in the United States (US), while the number is 8,000 for china. Over the past few decades, treatment has improved dramatically and the five-year survival rate is approximately 85%.

Decision modeling for economic evaluation for CAR-T cell therapy products

Dr. Weijia Wu
Zhejiang University

Dr Wu is currently a PhD student studying health economics at Zhejiang University in Hangzhou. Wu obtained the bachelor's degree and master's degree from Hebei University and Fudan University, respectively. So far, Wu have published articles in Pharmacol Res (IF=5.9) and Ther Adv Med Oncol (IF=6.8).

Before introducing the CAR-T therapy, we talk briefly about its target indication. Lymphomas and leukemias are cancers of the white blood cells. While both cancers arise in the bone marrow, lymphomas tend to form solid masses in lymph nodes and other places in the body, while leukemias primarily circulate in the bloodstream.

There are two primary kinds of lymphocytes: B-lymphocytes and T-lymphocytes. Currently, CAR T-cell therapy have been approved for treatment of Childhood B-Cell Acute Lymphoblastic Leukemia (B-ALL), Diffuse large B-cell lymphoma, and Mantle cell lymphoma.

Public attitudes for lung cancer screening among Chinese high-risk population

Dr. Zixuan Zhao
Zhejiang University

Dr Zhao is a PhD student supervised by professor Dong in Zhejiang University. She obtained the bachelor's degree of business management in Hohai University in 2017.She was a co-applicant on three successful bids for economic evaluation program on lung cancer treatment and screening (2019-21).

Background

- Lung cancer remains the leading cause of cancer-related death and the most common form of cancer worldwide
- The cancer related deaths number is much higher than the other forms of cancer
- In 2018, China has the highest ratio of new lung cancer cases, which accounted for 37% of all new lung cancer cases around the world
- The incidence rates of lung cancer demonstrate an increasing trend both in male and female populations in China

According to the 2018 cancer registration data in China, the distribution of the top 10 leading causes of cancer deaths showed that lung cancer was top for men (29.46%) and women (23.17%). The disease burden of lung cancer is heavy in China, especially for men.

Although there are no drugs which can prevent or reverse the progression of OA disease at present, current drugs can reduce pain, improve joint function, reduce inflammation, and therefore improving quality of life.

Cost-effectiveness analysis of drug treatments for osteoarthritis in China

Dr. Xueshan Sun
Zhejiang University

Dr Sun is a PhD. student in School of public health, Zhejiang University. She is currently studying economic modelling and health policy evaluation. Her major studying field is now the economic evaluation of osteoarthritis in China.

Background

- Osteoarthritis is the most common type of arthritis
- It is a degenerative disease with joint pain with the main symptoms due to fibrosis, chap, ulcer and loss of articular cartilage caused by various factors
- Due to wear and tear, the articular cartilage begins to degenerate
- The joint capsule thickens and more synovial fluid is produced in the capsule, resulting in joint swelling
- Bone spurs grow and the tissues around the joints start to be inflamed

Economic burden of antibiotic resistance in China: a national level estimate for in-patients

Dr. Xuemei Zhen
Shandong University

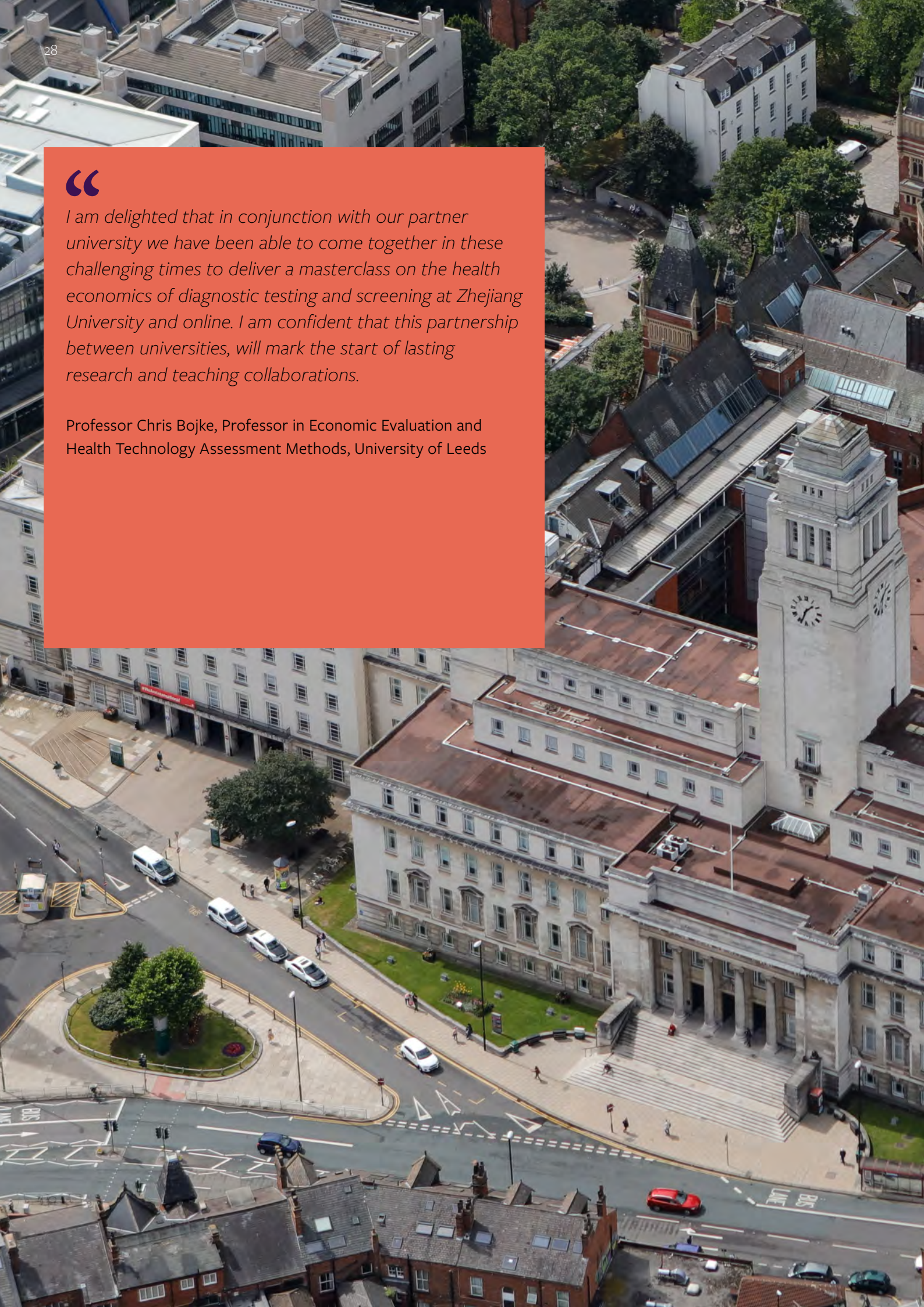
Background

- China was the second largest consumer of antibiotics (China 28% vs US 17%)*
- China has the most rapid growth rate of resistance (China 22% vs US 6%)

Objectives:

- To estimate the current status of AR
  - AR rates
  - The number of AR inpatients
- To quantify the economic burden of AR
  - Direct economic burden
  - Indirect economic burden
  - Societal economic burden

Total societal economic cost attributed to AR in inpatients in China of $77 billion, which is equivalent to 0.37% of China's GDP in 2017.



I am delighted that in conjunction with our partner university we have been able to come together in these challenging times to deliver a masterclass on the health economics of diagnostic testing and screening at Zhejiang University and online. I am confident that this partnership between universities, will mark the start of lasting research and teaching collaborations.

Professor Chris Bojke, Professor in Economic Evaluation and Health Technology Assessment Methods, University of Leeds

"Zhejiang University and Leeds University, alongside Bournemouth University, have overcome the Covid-19 pandemic to work together to deliver this on-line and off-line masterclass programme focusing on the health economics of diagnostic tests and screening. This is a great trial.

Professor Hengjin Dong, Professor in Health Policy and Health Economics, Zhejiang University

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