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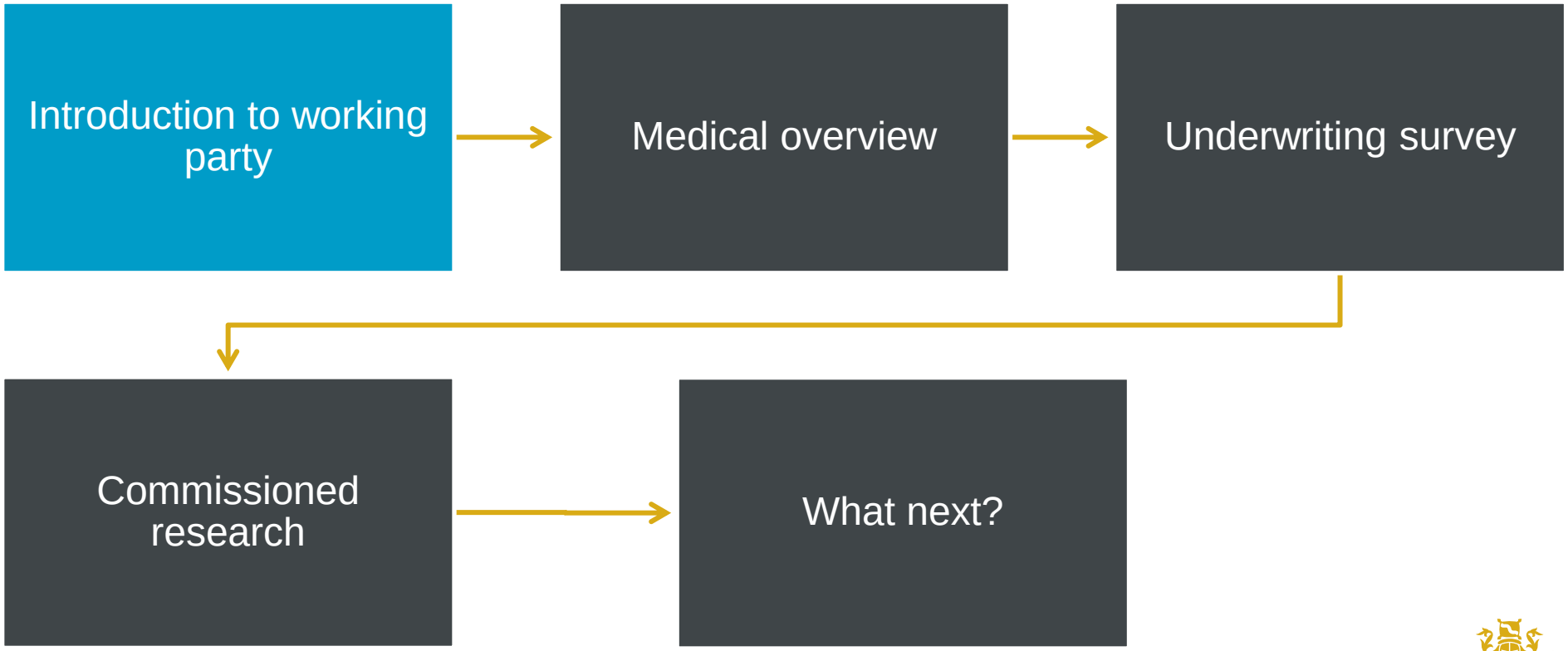
IFOA Diabetes Working Party - Can we manage Diabetes risk for healthier outcomes?

Nicola Oliver, Medical Intelligence
Joey Zhou, RGA

Agenda



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Introduction to Working Party

- Practice area – Health and Care, IFoA
- Established in 2018
- Previous IFoA research
  - JIA 75 (1949) 0094-0100, An Investigation into the mortality of diabetic patients attending the diabetic clinic of King's College Hospital, Arthur James Steed, FIA
  - JIA 91 (1965) 286-336, An Investigation into the mortality of diabetes, R E Hayward, FIA and B C Lucena, FFA
  - JIA (1974) 101:405-413, B H Shaw
- More recent IFoA research
  - Impactability modelling: A worked example in type II diabetes (2019, Hot topics in Health and Care)
  - The Impact of Diabetes Mellitus II on Longevity and Morbidity Risk (2018/2019, Njabulo Ncube, UEA (UK))

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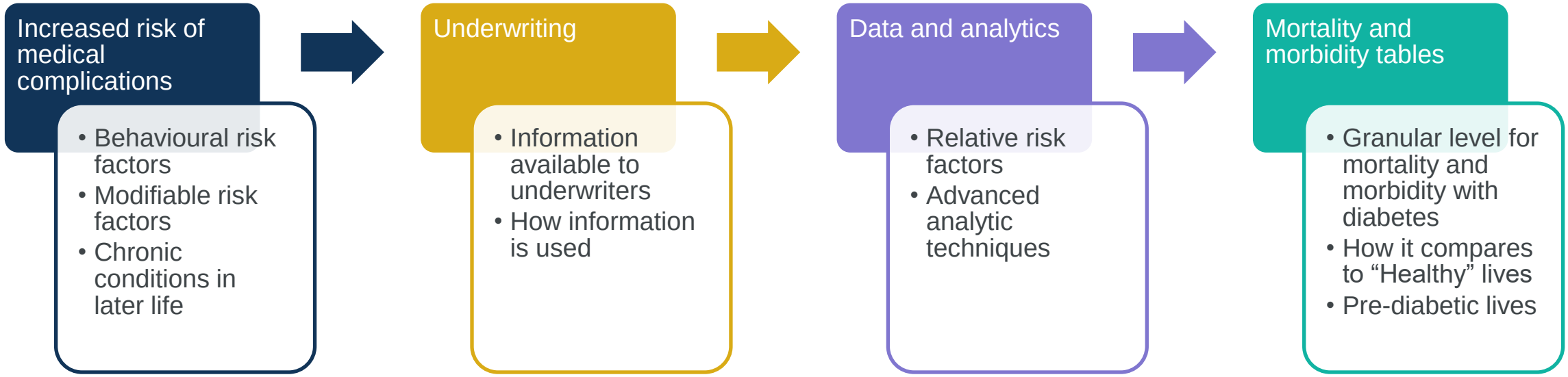
Objectives of the research

Develop a deeper understanding of the risks associated with a diagnosis of type 1 or type 2 diabetes and the impact of recent improved treatments



Can the insurance industry act to encourage a change in behaviour of our customers to prevent/postpone early diabetes related deaths and later in life chronic conditions

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Working Party Members

Name of members	Role	Firm	Location	Occupation
Nicola Oliver	Chair / SG Chair	Medical Intelligence	UK/France	Medical
Scott Reid	Deputy Chair / SG member	Zurich / Switzerland	UK/Switzerland	Actuary
Ian Catchpole	SG Deputy Chair	Aviva	UK	Actuary
Jon Lambert		Swiss Re	UK	Medical Underwriter
Matthias Schneider	Workstream co-ordinator	Zurich / Germany	Germany	Risk Management
Peter Chadwick		GPC Pensions Ltd	UK	Actuary
Chris Bagnall		Zurich / Switzerland	Switzerland	Medical Underwriter
Han Yan		Canada Life	UK	Actuary
Sol Jiarong		Swiss Re	China	Actuary
Joey Zhou	Workstream co-ordinator	RGA	Singapore	Actuary
Roshan Tajapra		SCOR	UK	Actuary
Brian Cunningham		Aviva	Ireland	Actuary

Health & Care Research shadow	Role	Firm	Location	Occupation
Ewen Tweedie	Shadow H&C Research comm	PwC	UK	Actuary

Consultants to WP	University	Role
Professor Neil Munro	University of Surrey	Academic
Professor Kamlesh Khuni	University Leicester	Clinician and Academic
Professor Simon Lusignan	University Surrey	Clinician and Academic

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Steering Group commissioning partners

Purpose and membership

- To oversee delivery and quality assurance of this commissioned research
- To ensure research outputs that are of a high quality and in line with expectations, producing findings that are relevant to the actuarial community, industry and other key stakeholder groups
- Group comprises of:
  - 2 IFoA members (Chair and member of Diabetes Working party)
  - 5 representatives for each commissioning partner
  - 1 independent Academic
  - 2 IFoA Executive – Research Project Manager, ARC Manager – non-voting members

Commissioning partners

Pacific Life Re · Swiss Re · PartnerRe · Zurich · L&G · Actuarial Research Centre, Institute and Faculty of Actuaries

Independent academic guidance

Cass Business School, City University London (EST 1894)

Academic Partner

University of Leicester

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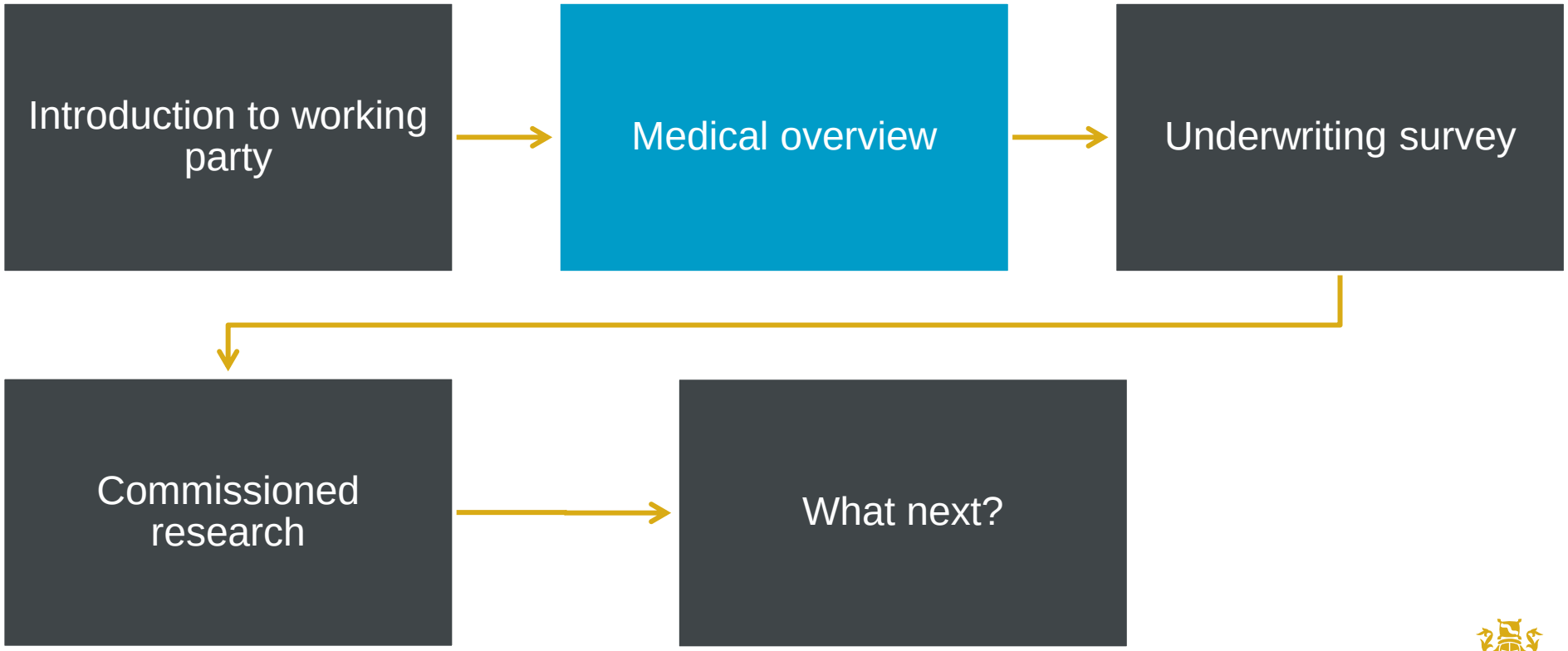

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World Health Organization

"The term **diabetes mellitus** describes a metabolic disorder of multiple aetiology characterized by chronic **hyperglycaemia** with disturbances of carbohydrate, fat and protein metabolism resulting from **defects in insulin secretion**, insulin **action**, or both. The effects of diabetes mellitus include **long-term damage, dysfunction and failure of various organs**."

Inability to produce or respond to insulin

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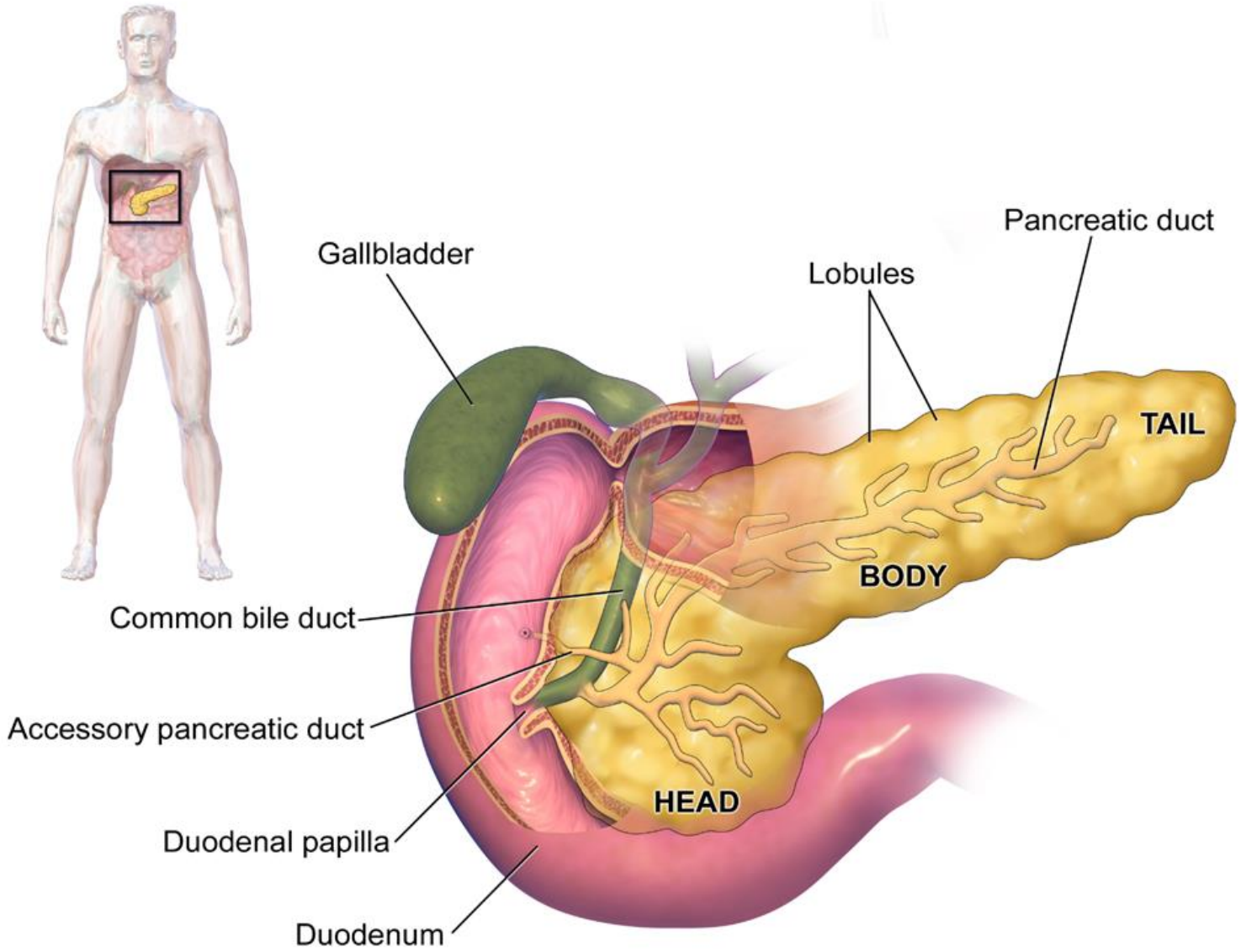

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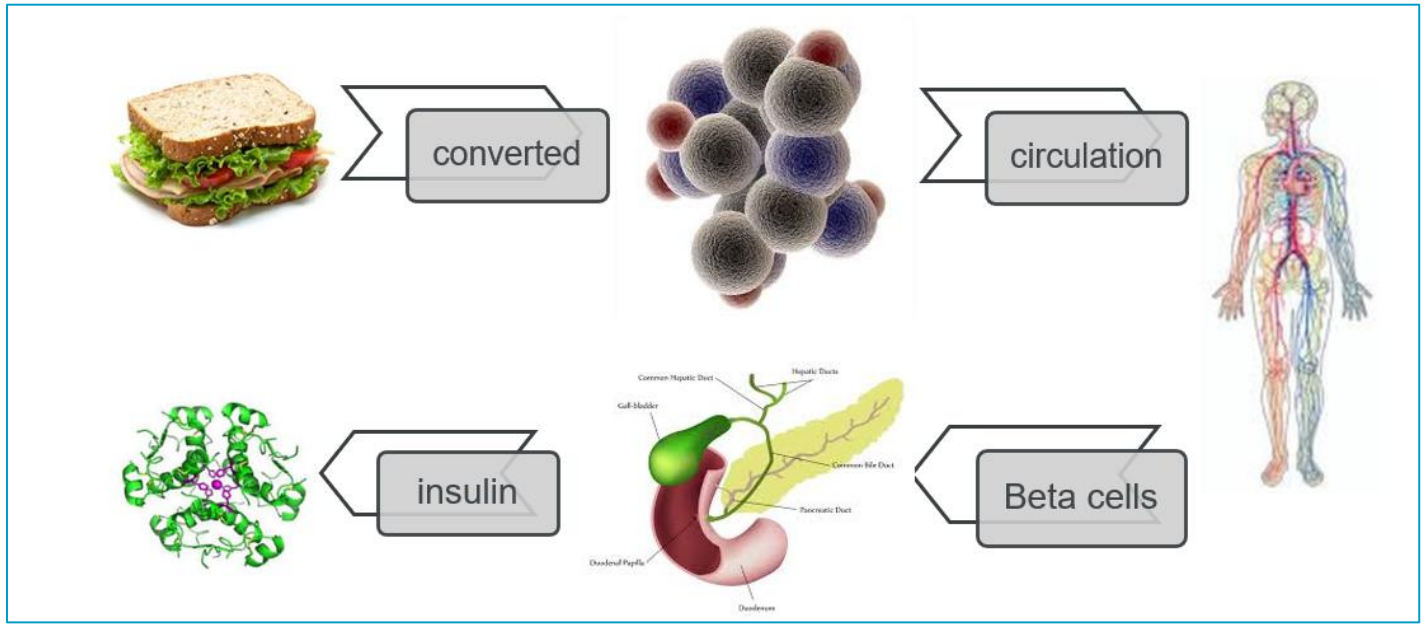

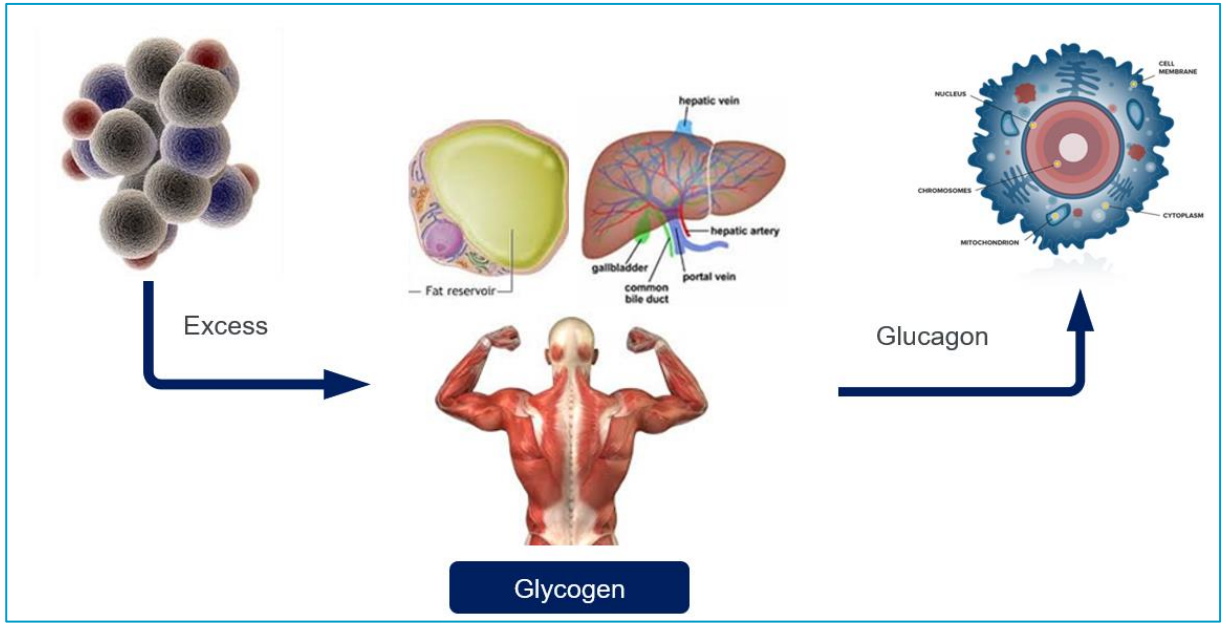

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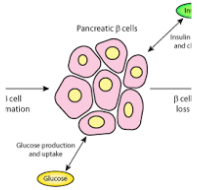
Type 1 Diabetes

Insulin Dependent

Develops in young lives

Chronic autoimmune disease caused by destruction of the beta-cells



Requires life-long treatment with insulin

Type 2 Diabetes

Non-insulin dependent (can progress)

Usually develops in older lives

Insulin resistance related to lifestyle factors

Often treated with oral meds

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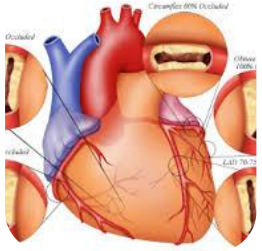
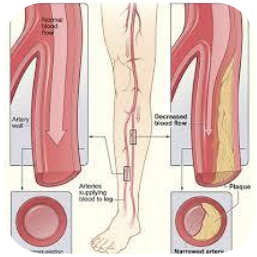
Macrovascular Complications



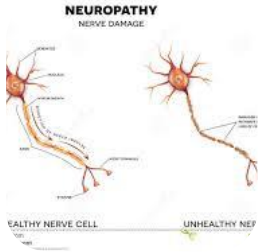
Coronary artery disease



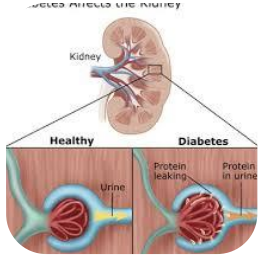
Peripheral arterial disease

Stroke

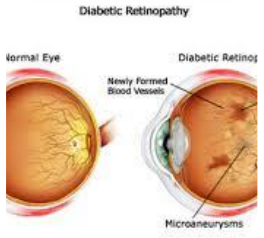
Microvascular Complications



Neuropathy



Nephropathy



Retinopathy

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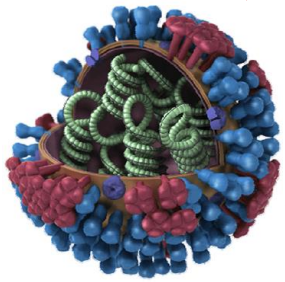
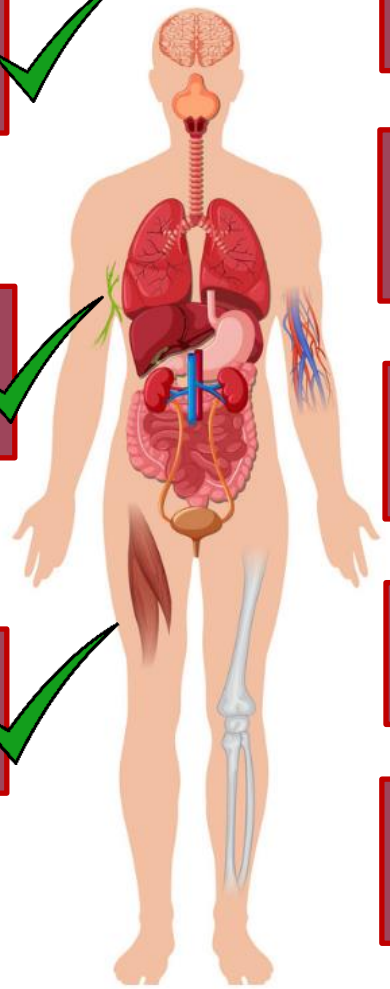
COVID and Diabetes

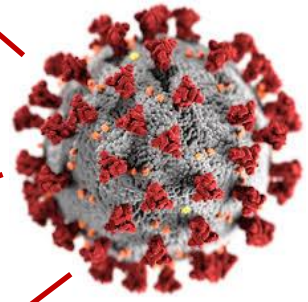
INFLUENZA



- Enters cells via the respiratory tract
- Also causes GI symptoms
- Myalgia & arthralgia common



SARS-CoV-2



- Key enzyme is ACE2
- Implications for cardiovascular system
- Renal system also vulnerable
- Clotting cascade is disrupted
- Immune system mounts a brisk over-reaction

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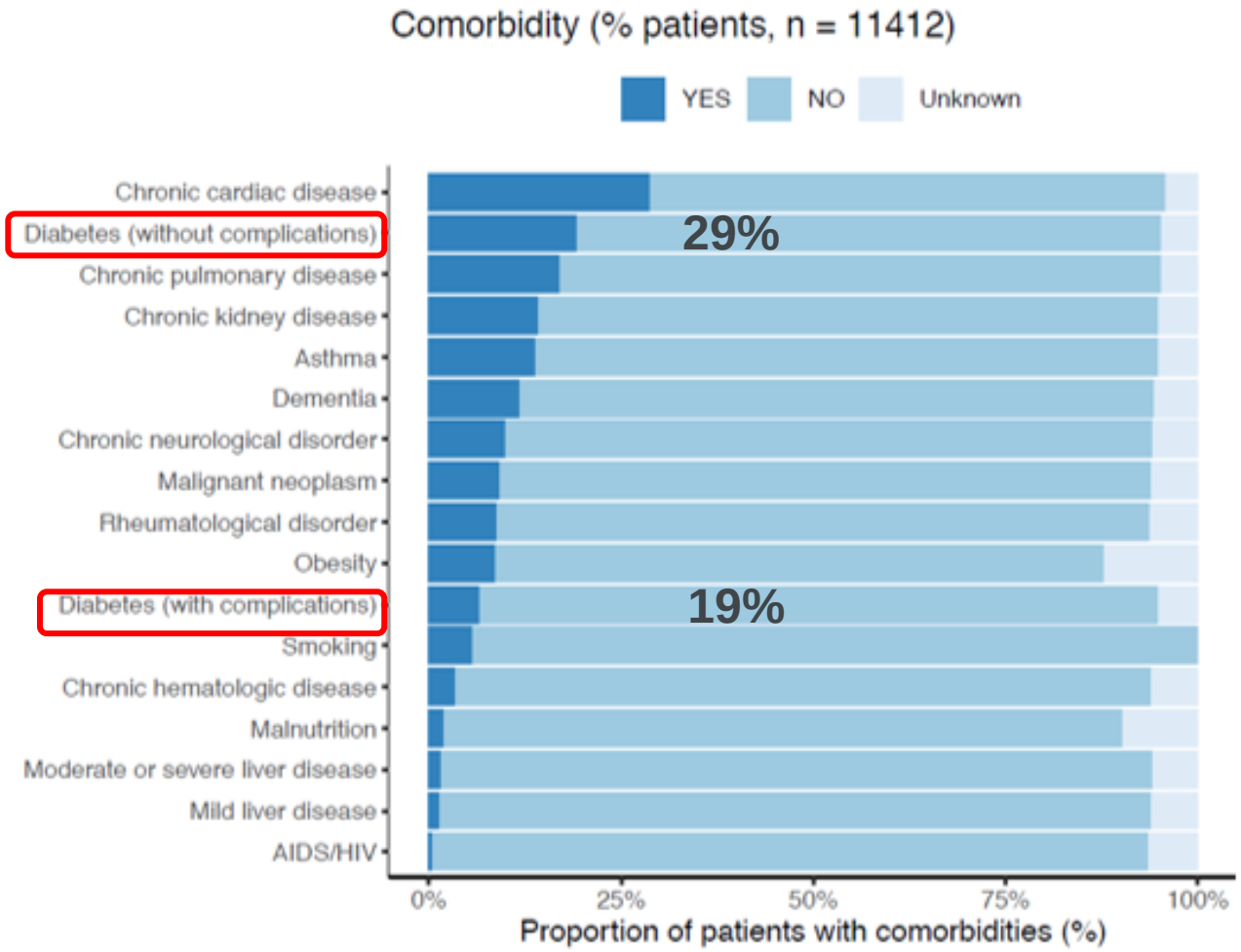
COVID and Diabetes

Features of 16,749 hospitalised UK patients with COVID



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COVID and Diabetes

OpenSAFELY: factors associated with COVID-19-related hospital death in the linked electronic health records of 17 million adult NHS patients.

Hazard Ratios (HRs) and 95% confidence intervals (CI) for in-hospital COVID-19 death

Diabetes (vs none)	Death HR (95% CI)	
	Age-sex adjusted	Fully adjusted
Controlled (HbA1c<58 mmol/mol)	2.02 (1.89-2.16)	1.50 (1.40-1.60)
Uncontrolled (HbA1c>=58 mmol/mol)	3.61 (3.34-3.90)	2.36 (2.18-2.56)
No recent HbA1c measure	2.35 (2.04-2.70)	1.87 (1.63-2.16)

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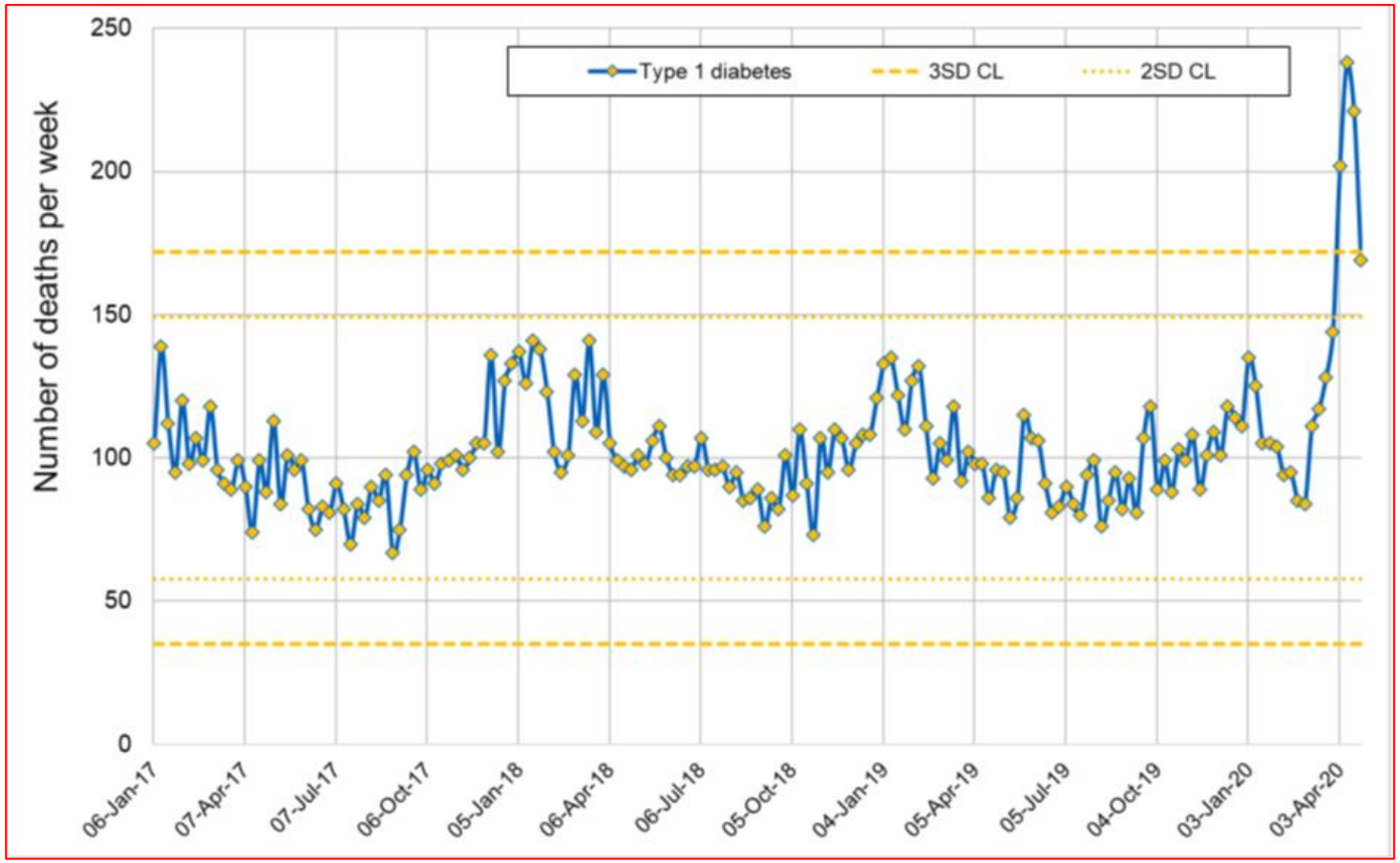
COVID and Diabetes

Type 1 and Type 2 diabetes and COVID-19 related mortality in England: a cohort study in people with diabetes



Weekly number of deaths in people with Type 1 diabetes in England January 2017-April 2020

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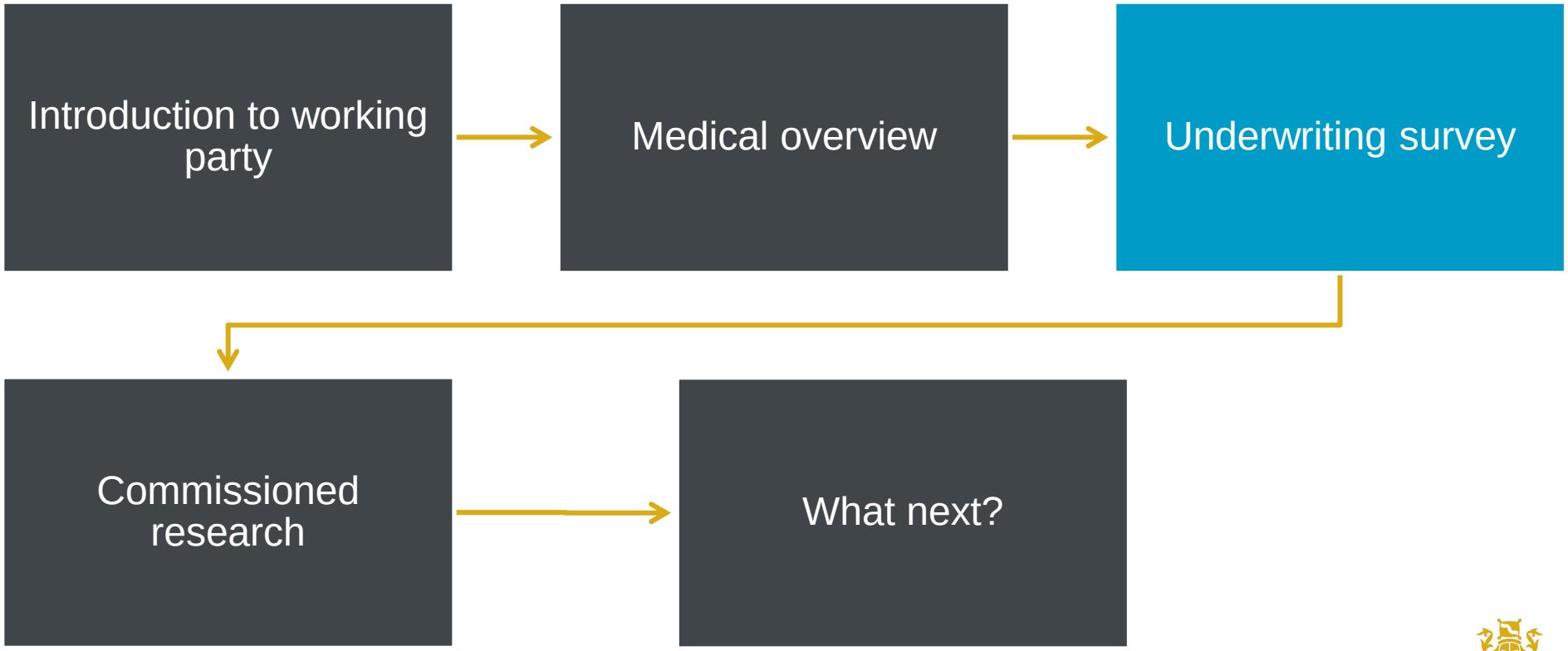

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How do we underwrite diabetics today?

Guidelines

- **Internal** and/or **reinsurers** manuals
- **Type 1** and **type 2**
- **Impaired glucose tolerance and pre-diabetes**
- **Product**

Range of measures used in initial underwriting

- **HbA1c**
- **BMI**
- **Cholesterol**
- **Blood pressure** - diastolic/systolic
- **Smoking**
- **Duration since diagnosed**
- **Complications of diabetes developed**

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Underwriting survey and link to research

Size of survey

- **Survey had a wide coverage**
  - UK
  - Asia excluding mainland China
  - mainland China

Key observations

- **Pre-diabetes potential area for great insight**
- **18% to 30% follow Own manual** rather than reinsurers
- **Age and smoker are used as a rating factor** in consideration of diabetes underwriting decision
- **Majority of respondents don't use physical activity as a rating factor**
- **Collection of medical evidence varies significantly** due to different health care systems
- **Survey highlights better access to HbA1c data may be useful** in providing a more accurate assessment
- **Products offered vary between countries**

Link to research

- **Pre-diabetes is a key part of the research** and is important for **prevention**
- **HbA1c is a key relative risk factor included in our research** along with interaction with other factors
- **Research in incidence and cause of disability** will enable a **better understanding** of the nature of the disability

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Comparing UK, Asia and mainland China market

Asia

- Business is sold as long-term cover.
- Predominately an intermediary market (agency and bancassurance). The digital channel is becoming popular in selected markets only (e.g. China.)
- There are more and more products emerging targeting diabetic lives over the recent years. Risks cover from life to Critical Illness to Medical. Nevertheless, it is still limited to selected providers in selected markets at this point of time (still niche).

UK

- Business is sold as long-term life cover called Protection
- Predominantly an intermediary market
- There are only a few diabetics products but niche and limited to life cover
- Diabetics can get life cover but will pay more than a standard life but limited in terms of Critical Illness and Income Protection
- A feature of the products developed to date is the ability to do continuous underwriting to encourage/ nudge a change towards healthier behaviour

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Summary of diabetes propositions in the market

	Vitality	The Exeter	Royal London	AXA 安盛	AIA	Prudential
Country	UK	UK	UK	Hong Kong	Singapore	Indonesia
Life/Non-Life	Life	Life	Life	Critical Illness / Medical insurance	Critical Illness	Life and Medical Insurance
Product Name	Wellness Optimiser	Managed Life	Diabetes Life Cover	AXA Diabetes and Three-Highs Management Programme	AIA Diabetic Care	Diabetic special program to PRUPrime Healthcare Plus
Channel	Intermediary	Intermediary	Intermediary	Intermediary	Intermediary	Intermediary
Target Market	Healthy people	Type II Diabetics High BMI customers	Type I and II Diabetics	Type II High blood pressure High cholesterol High BMI	Type II and pre-diabetics	Type II
Underwriting	Full	Full	Full	Full	Targeted (Simplified)	Full
Insured Events	Death/Terminal Illness	Death/Terminal Illness	Death/Terminal Illness	Critical Illness / Medical insurance	Selected Critical Illness that are relevant to DM	Death / Medical insurance
Type benefit	Lump sum	Lump sum	Lump sum	Lump sum / (medical reimbursement)	Lump sum	Lump sum / (medical reimbursement)
Additional features	Rewards program Cash back	n/a	Helping Hand Service – access to specialist diabetes nurse for advice	1 year health mgt prog Diabetes mgt Mgt metabolic risks	Reward program (Via AIA Vitality)	n/a
Premium structure	Level, adjustable based on blood sugar, blood pressure, BMI, cholesterol measure	Level, adjustable based on blood test results (up to 35% reduction)	Level, adjustable based on blood test results (up to 40% reduction	One-off 15% premium rebate after completion of 12 month program.	Level	Charges under ILP structure
Monitoring method	Customer submitted	Customer submitted	Customer submitted	Nurse consultation	Customer submitted	n/a

Services….

Small sample of solutions


Diabetes Pal

Diabetes Connect


Passive

- Education and coaching through the app
  - Diet, activity, sleep, wellbeing …

Active management

- Active management of glucose levels
- Integrated to clinic / doctor
- Management of drugs

Intensive management

- Intensive one-to-one coaching over an initial period

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UK Example of continuous underwriting underwriting

Band	Your initial result	
	%	mmol/mol
1	Less than 7.0%	Less than 53.0
2	7.0% - 7.99%	53.0 - 63.8
3	8.0% - 8.99%	63.9 - 74.8
4	9.0% - 9.99%	74.9 - 85.7
5	10.0% - 10.99%	85.8 - 96.6
6	11.0% or greater	96.7 or greater

Number of bands your HbA1c blood test result has reduced by	1	2	3	4	5
Percentage reduction in total premium each year	1.75%	3.5%	5.5%	6.5%	8%
Maximum total reduction	10%	20%	30%	35%	40%
Number of bands your HbA1c blood test result has increased by	1	2	3	4	5
Percentage increase in total premium each year	1.78%	3.62%	5.82%	6.95%	8.70%

	Year 0	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9
Band 6										
Band 5										
Band 4	$900									
Band 3		$884.25								
Band 2					$762.01	$735.34	$720.00			
Band 1			$835.61	$789.65						

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Asia example – an example that targets DM lives

- AIA Singapore Diabetic Care

Critical Illness Coverage
Coverage of 6 Critical Illness: Blindness, heart attack, coronary artery bypass surgery, stroke, kidney failure, and amputation (20% additional payouts)

Cancer Coverage
Optional Coverage of cancer, including 20% payouts for early to intermediate stage cancer

Simplified Underwriting
No Need for any medical examinations

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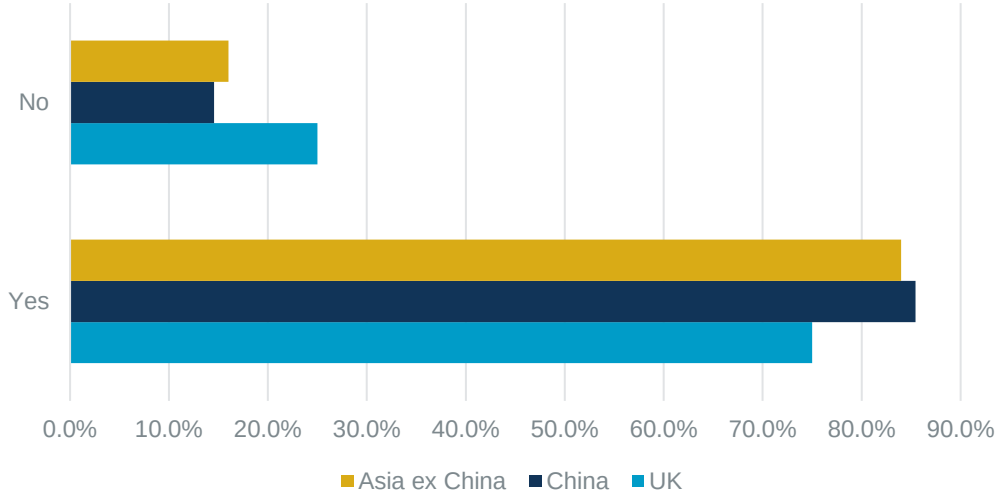
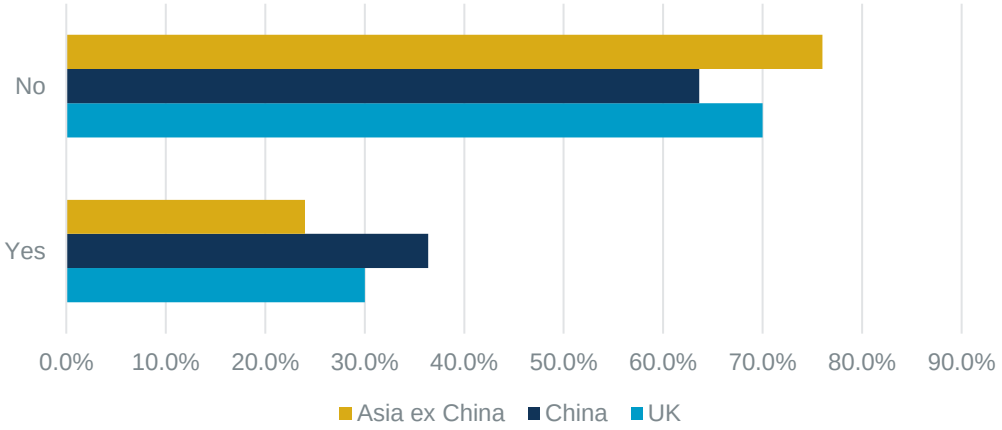
Do you ask specific questions about abnormally raised blood sugar or pre-diabetes



- Do you ask a specific question of the applicant as to whether they have abnormally raised blood sugar?



- Do you ask a specific question of the applicant as to whether they have pre-diabetes?

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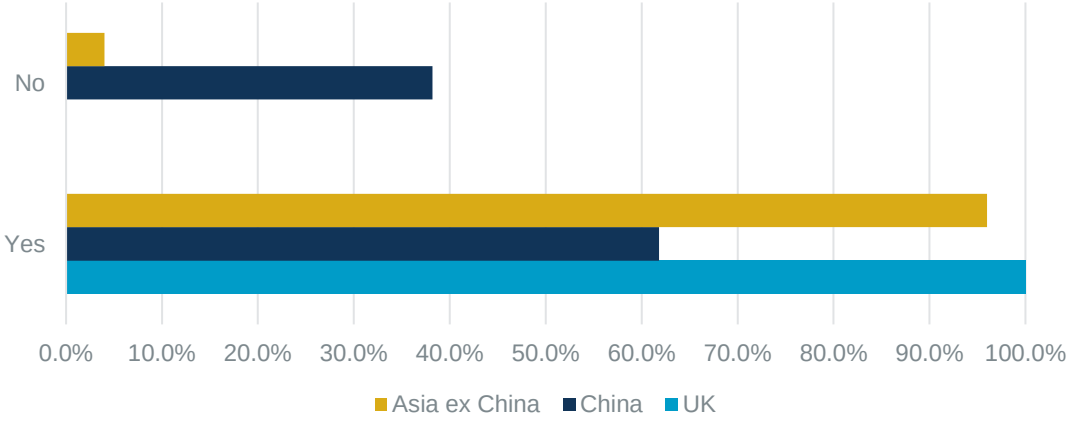
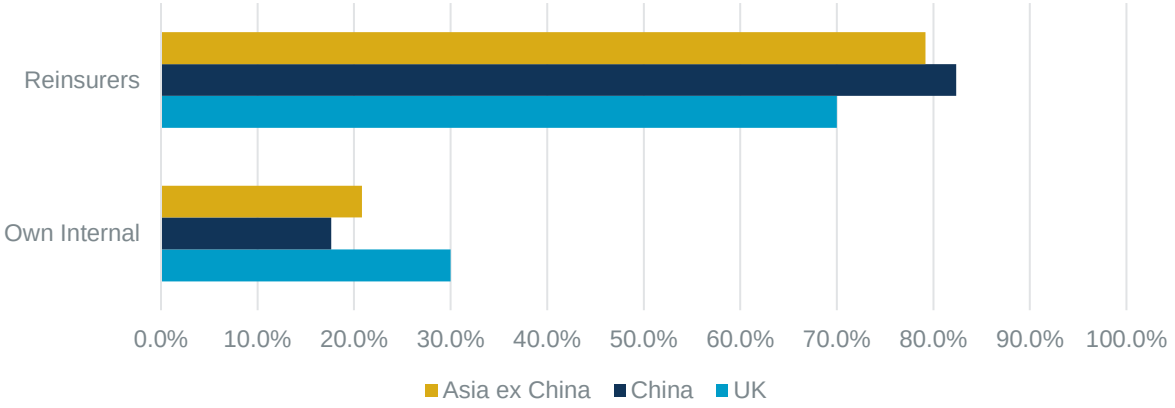
Risk assessment guidelines used by underwriters for diabetics



- Do you have specific risk assessment guidelines used for the underwriting of diabetics?



- If yes, are these guidelines based upon your 'own' internal assessment of the risk or do you use those provided by 'reinsurers'?

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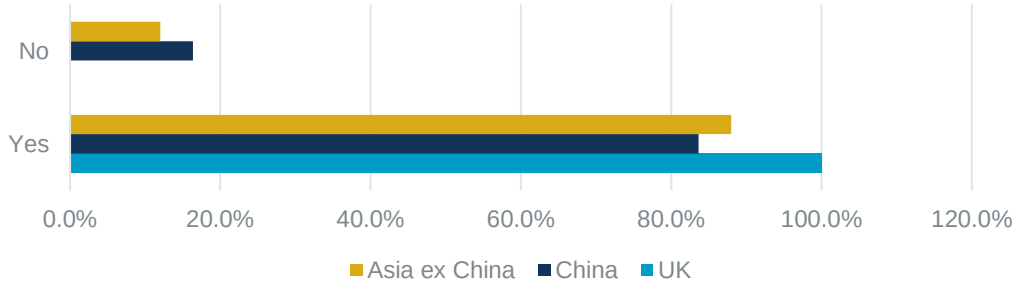
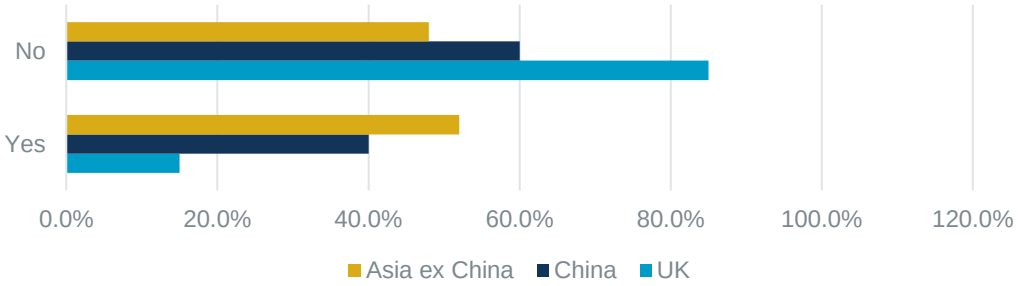
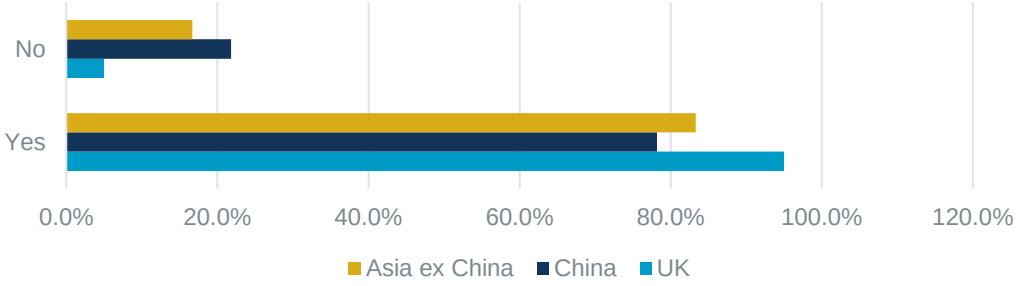
Age, gender and smoker status







- Do you use applicant age in your risk assessment of diabetics?
- Do you use applicant's gender in your risk assessment of diabetics?
- Do you use applicant's smoking status in your risk assessment of diabetics?

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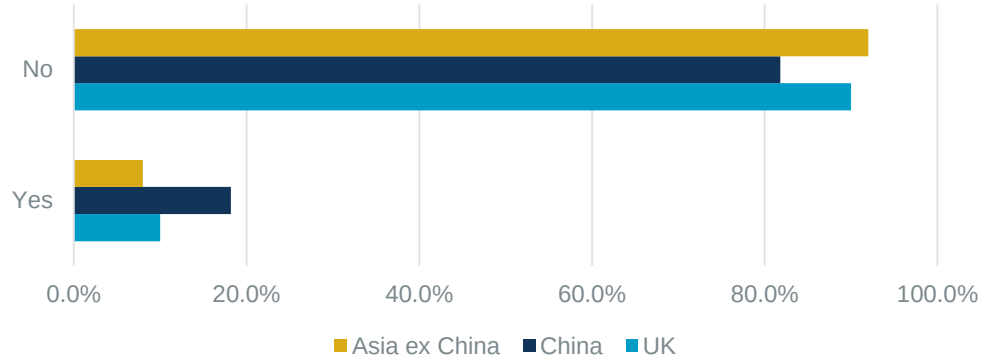
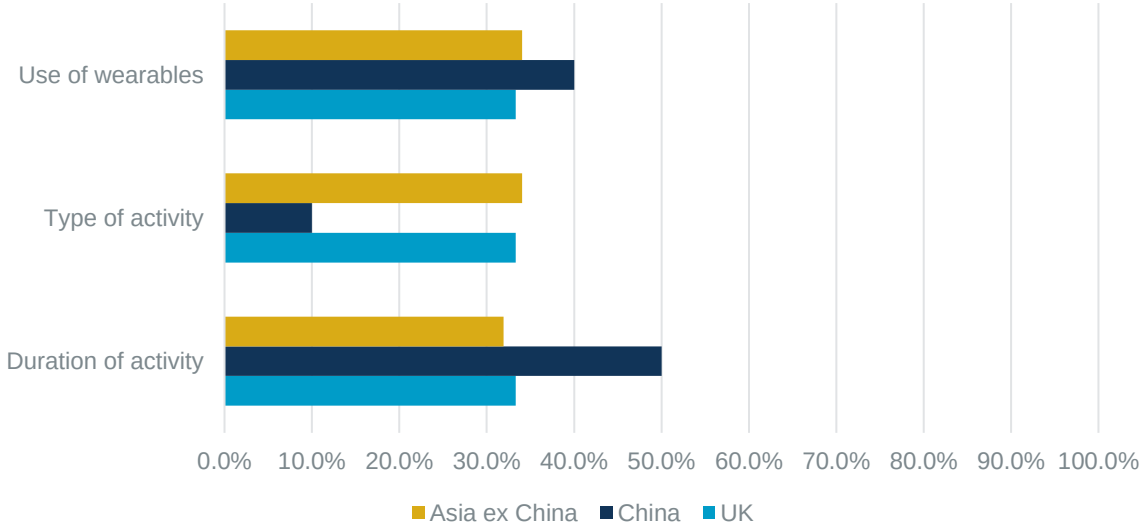
Physical activity levels





- Do you ask applicants about physical activity levels in your risk assessment?

- If you do ask applicants about physical activity levels in your risk assessment, do you ask about:

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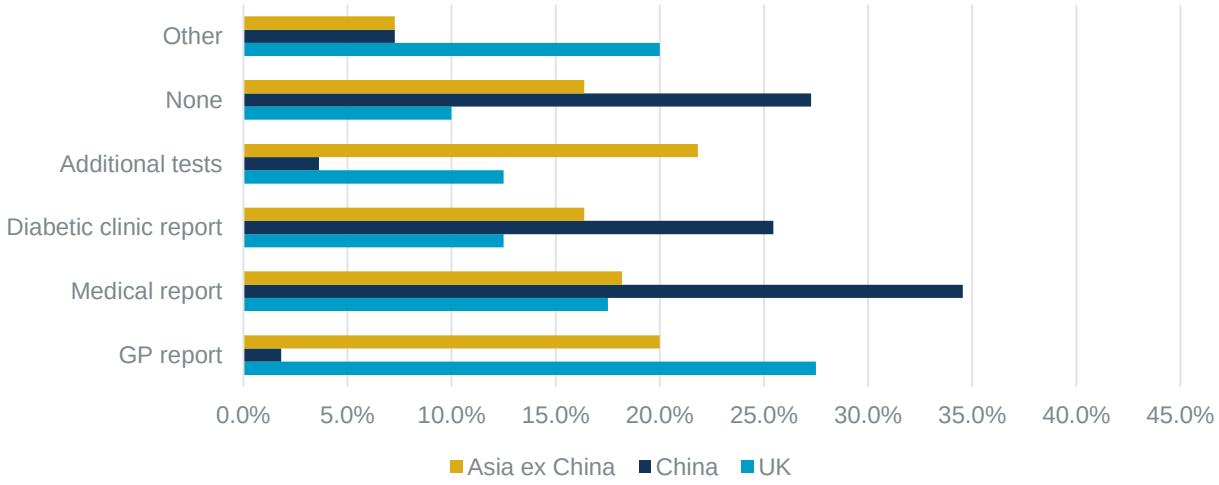
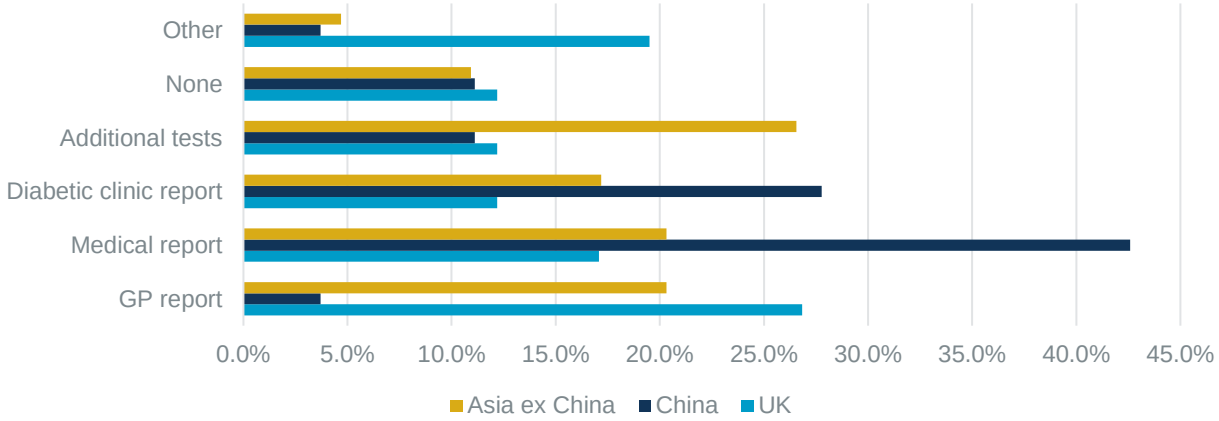
Medical evidence



- What approximate percentage of applications from type 1 diabetics for insurance require the following medical evidence?



- What approximate percentage of applications from type 2 diabetics for insurance require the following medical evidence?

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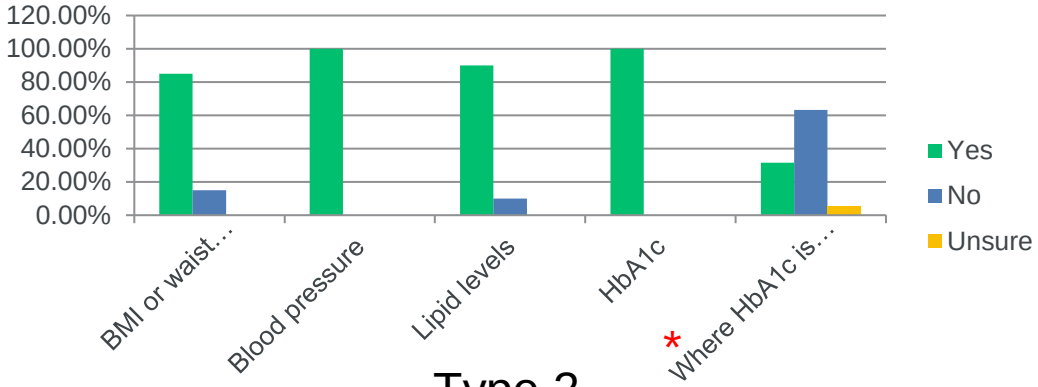
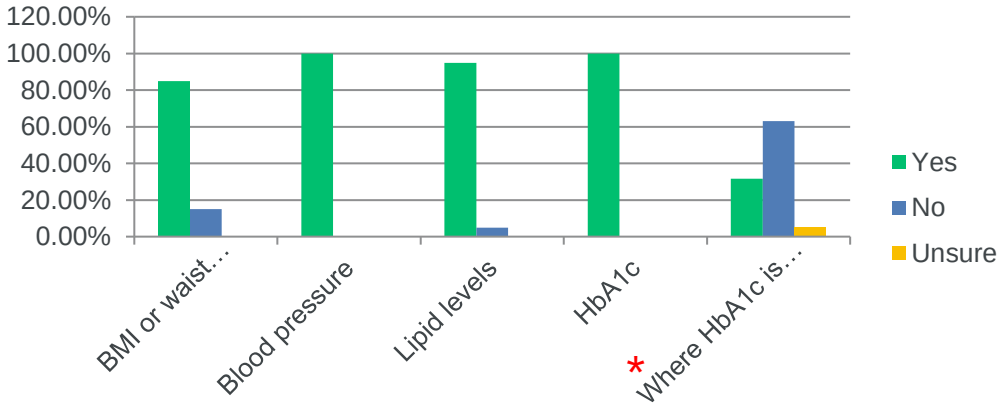
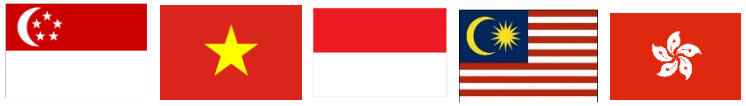
Measures used in risk assessment of diabetics T1 or T2

Type 1

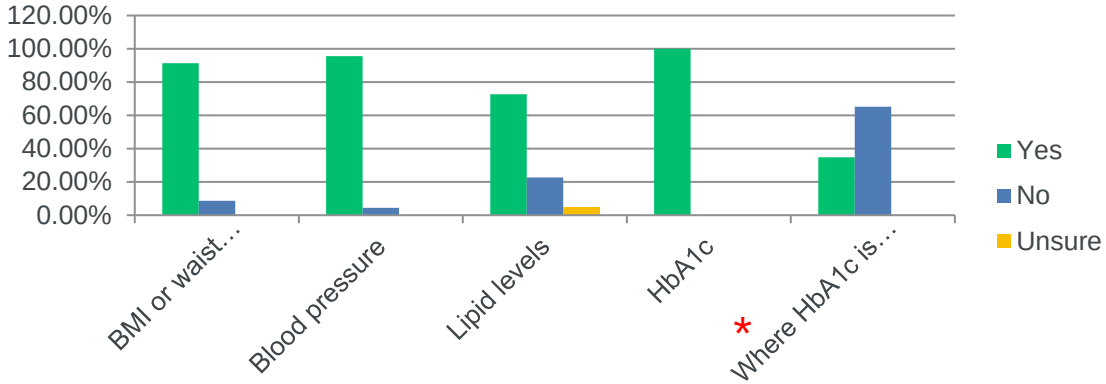


Type 2

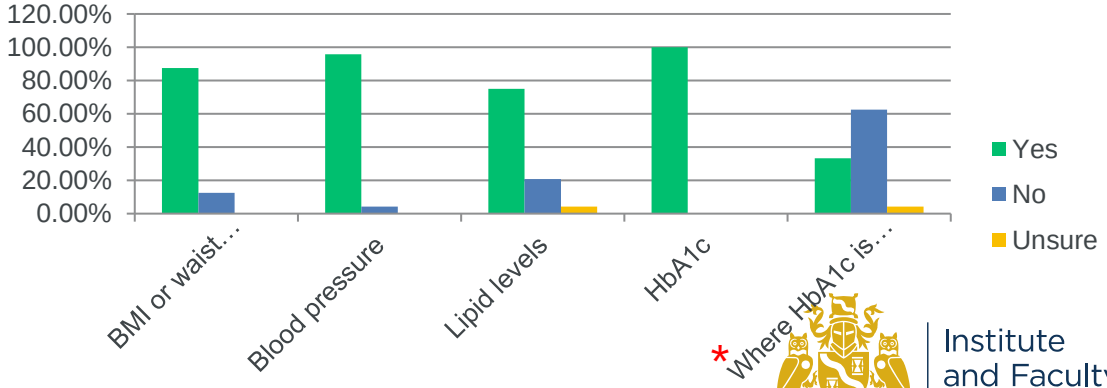




Type 1



Type 2



*Where HbA1c is unavailable do you allow assessment based on daily sugar results alone?

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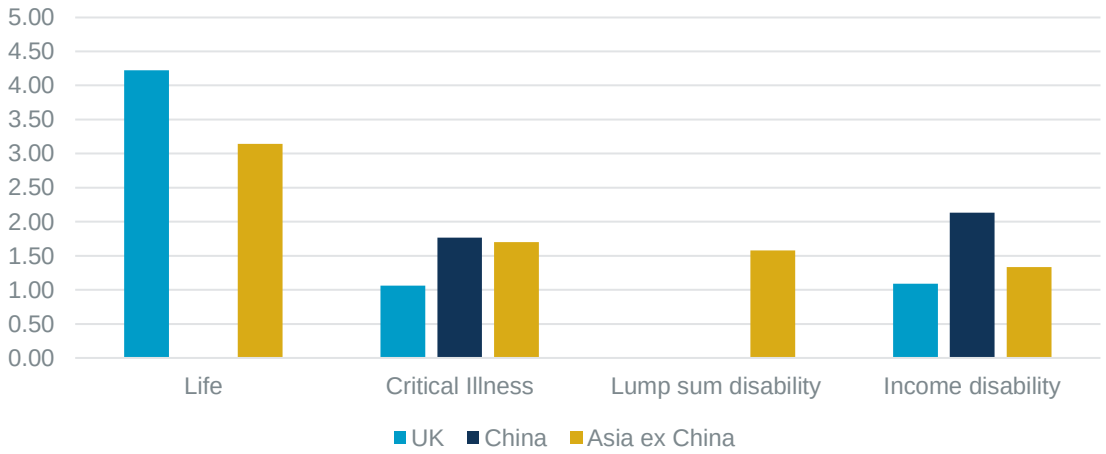
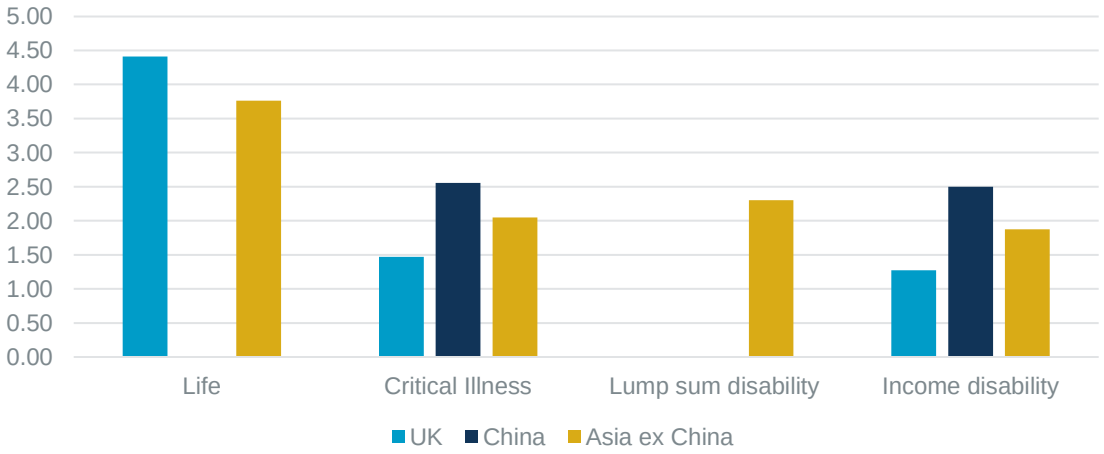
Product offered in terms of average on scale 1 (unlikely to 5 (very likely)



- How likely would it be that you would offer the following benefits to an applicant with type 1 diabetes (1 is very unlikely and 5 very likely)?



- How likely would it be that you would offer the following benefits to an applicant with type 2 diabetes (1 is very unlikely and 5 very likely)?

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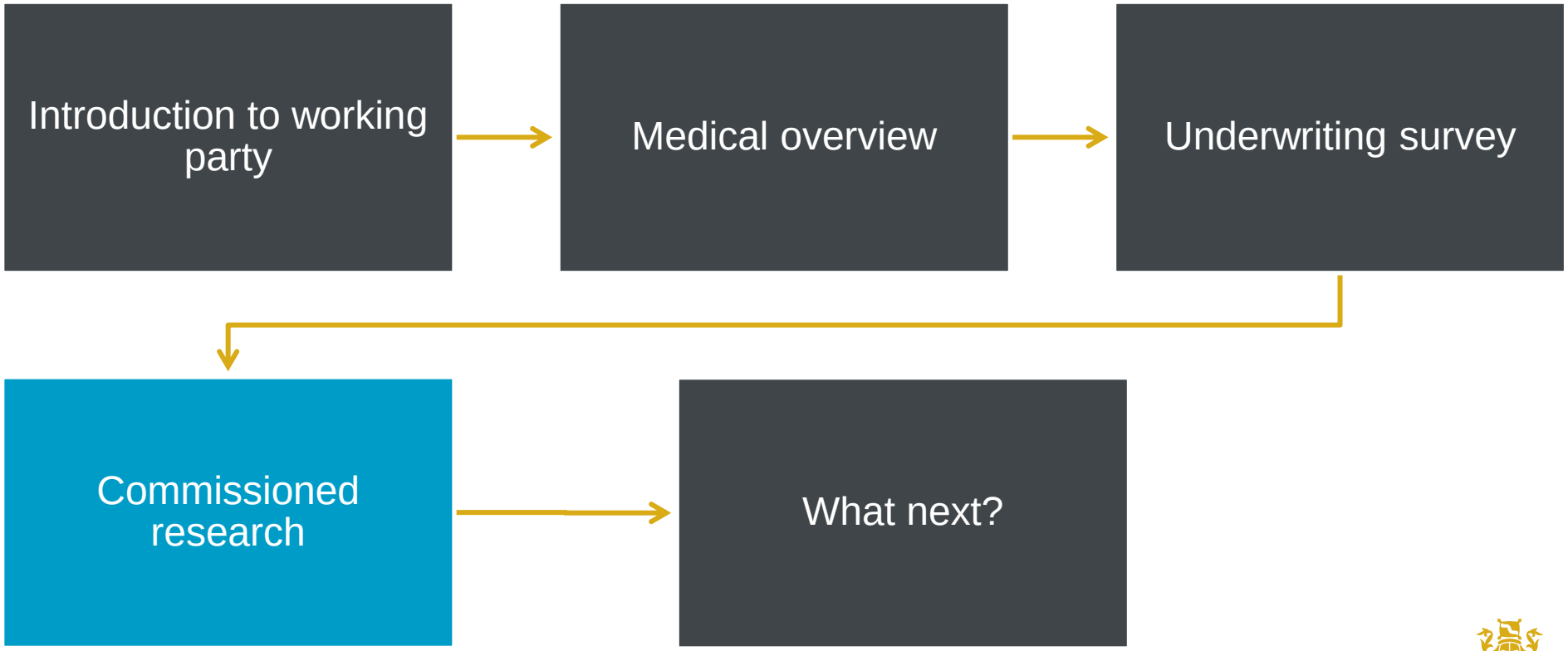
Agenda



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Deliverables of commissioned research

Relative risk factors	• **Understanding of the underlying drivers** • **Risk factors**
Interaction between the risk factors	• **Understanding the interactions** between the risk factors and confounding effects • **How any of the known variables that drive risk interact** in terms of their individual and cumulative impact
Mortality and morbidity base levels	• **Healthy lives** (excluding Type 1, Type 2 and lives that would be rated in an insurance context) • **Lives at risk of diabetes** (Pre-diabetes) • **Diabetic (Type 1 and Type 2)** • **Diabetic Type 2 recoveries**
Cause of death or cause of disability	• Split of mortality rate by **cause of death** • Investigate **chronic conditions** present prior to death
Trend in diabetes over time cause of disability	• **Examine trends** in experience over the past 10 years using publicly available data • Future projections of trends is not in scope

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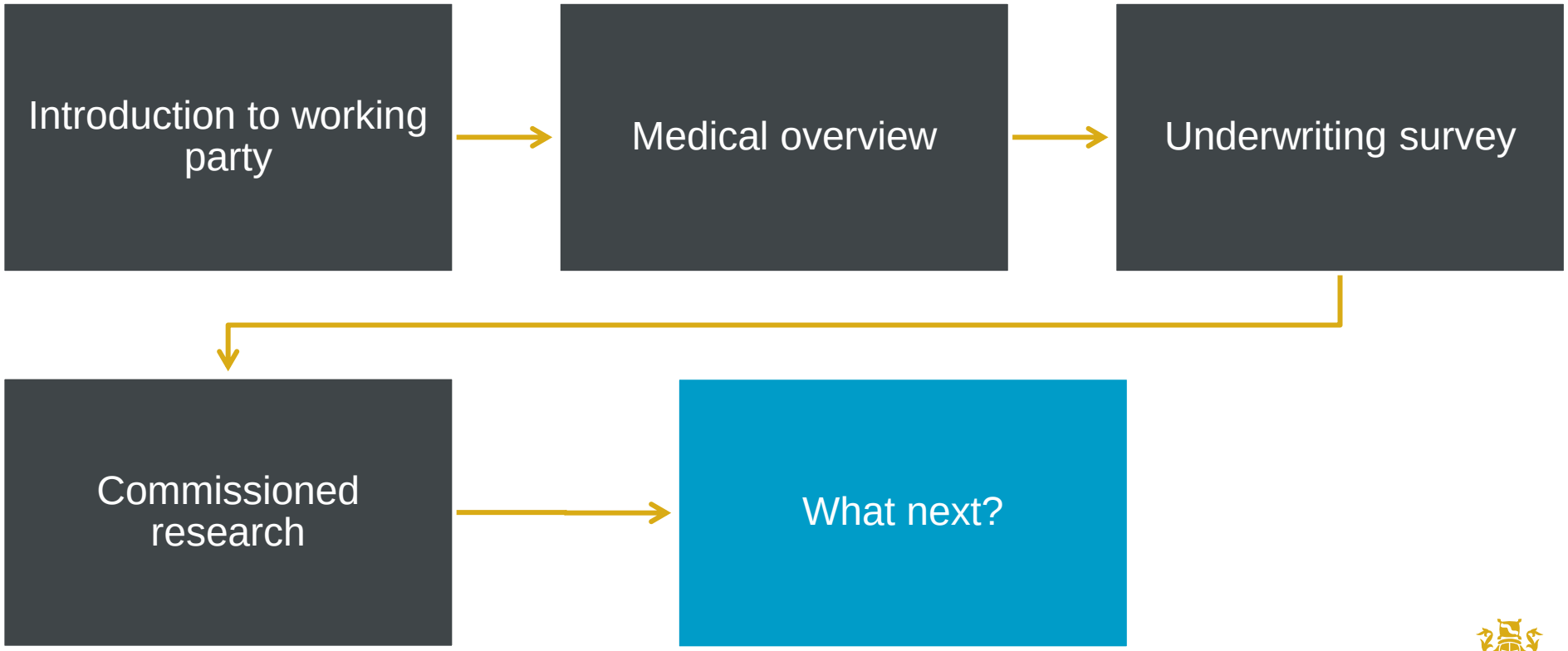
Agenda



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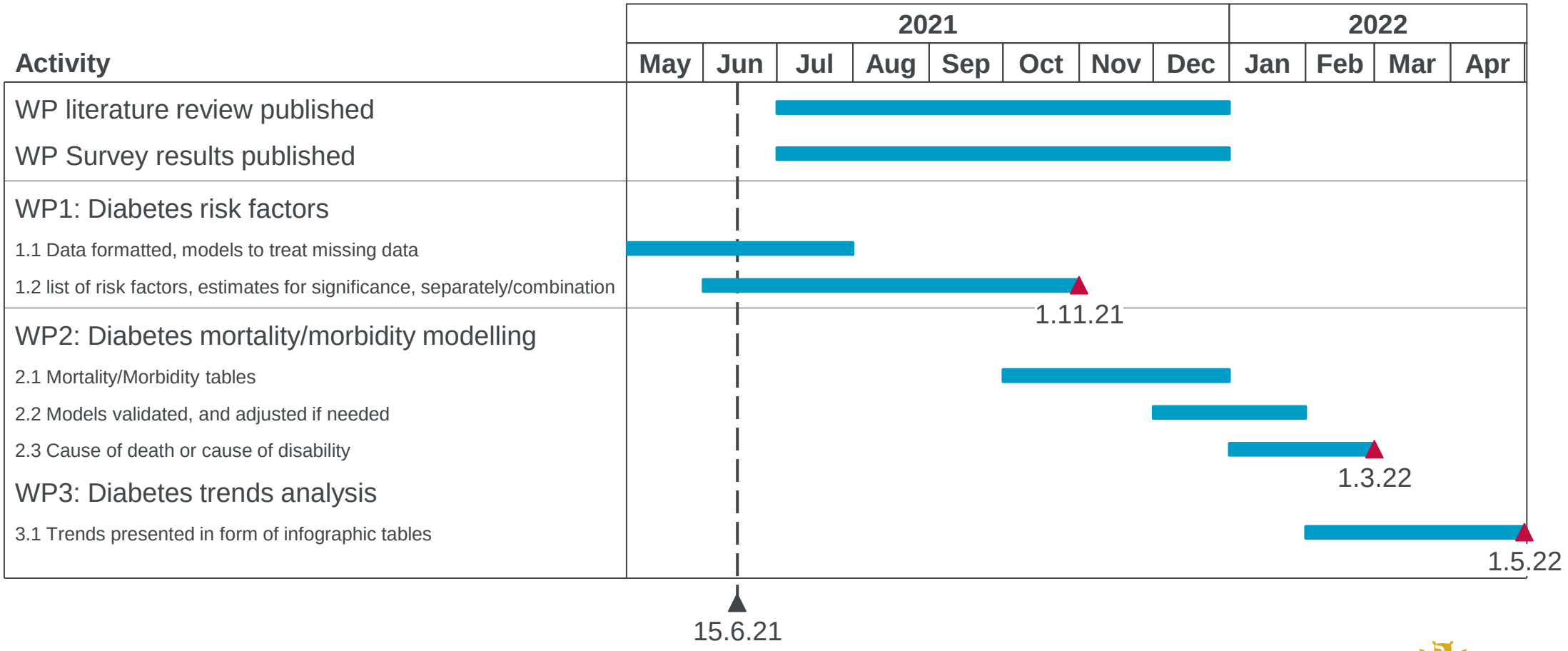
Where we are?



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- Published data does not reflect current experience
- Dietary & other lifestyle changes
- Newer, more effective pharmaceutical management
- *“One of the major factors for mortality is therapeutic inertia”* -Prof Khunti
- *“We put the low carbohydrate diet on trial to prove there is no evidence that the diet is dangerous. In the end we won and set a legal precedent.”* – Prof Noakes

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Questions

Comments

Expressions of individual views by members of the Institute and Faculty of Actuaries and its staff are encouraged.

The views expressed in this presentation are those of the presenter.

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