

1 What is known?

Pancreatic cancer is:

- **14th most common cancer** worldwide.
- Currently the **7th leading cause of cancer deaths**.
- Predicted to become the **3rd leading cause of cancer deaths** in Europe in 2025¹.

Why such high mortality?

- **Symptoms** are generally **non-specific** making diagnosis difficult for clinicians.
- **No current biomarkers** suitable for targeted or population-level screening.
- Often **diagnosed too late** for curative treatment.

What is being done about this?

- Numerous **statistical and machine learning models**, of varying complexity, have been developed to **aid earlier diagnosis**².
- When applied to healthcare data, these **models flag patients** who display symptoms or risk factors that indicate they likely **have pancreatic cancer**.
- One of the most promising is a model developed in the United States (US) called 'Enriching New-onset Diabetes for Pancreatic Cancer' (**ENDPAC**)³.
- We are conducting a feasibility study using this model, entitled **DEFEND PRIME**: DEtermining the FEasibility of calculating pancreatic cancer risk scores for people with New-onset Diabetes in PRIMary carE⁴.

2 Why the ENDPAC model?



It has been **externally validated** three times, **confirming** the model's **predictive ability**.



Its simplicity, using patient age, blood glucose and body weight changes to calculate a pancreatic cancer risk score, **increases its potential usability** over more complex models.



The required results are theoretically **routinely collected** in primary care in the United Kingdom (UK), meaning this **existing data resource can be (re)used**.

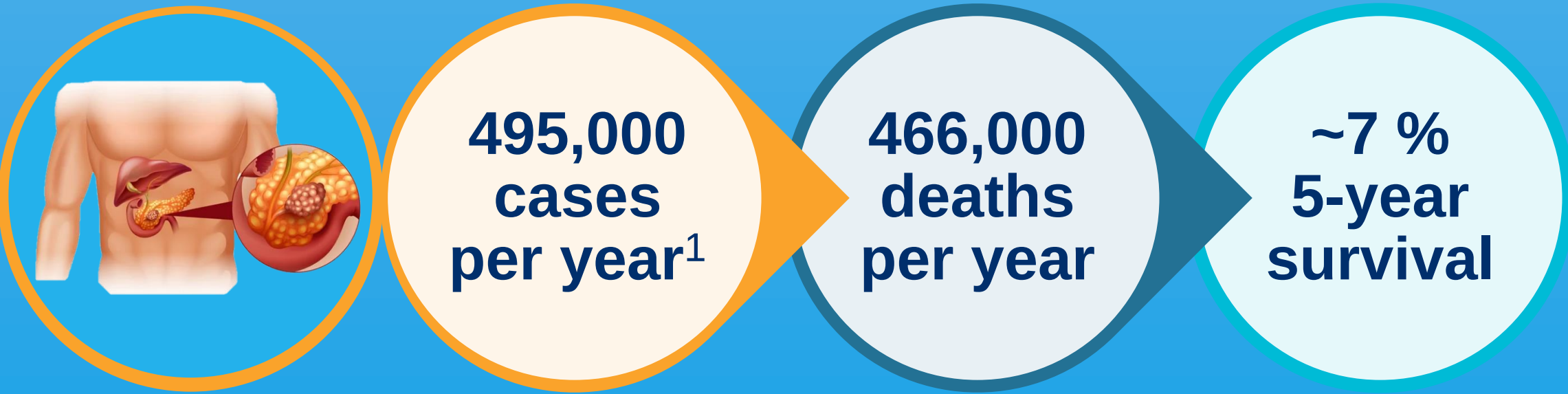


Figure 1: Location of the pancreas including example tumour, and global pancreatic cancer statistics.

3 What do we want to find out?



Can we develop a **reproducible method** of extracting the data from UK primary care systems for ENDPAC to function?



Are the **required data** held in UK primary care, principally in General Practice (GP), of **sufficient quantity and quality**?



Can the UK data be **converted** to function in the US ENDPAC model for patients and clinicians to have **sufficient confidence** in the risk scores generated?

4 What have we found so far?



We have **developed software** in collaboration with stakeholders to enable **reproducible data extraction** from 42 % of UK GP practices.



13 GP practices out of the 20 we are aiming for, have run the extraction software.



The results of the **preliminary analysis** are shown in the Sankey diagram (Figure 2).

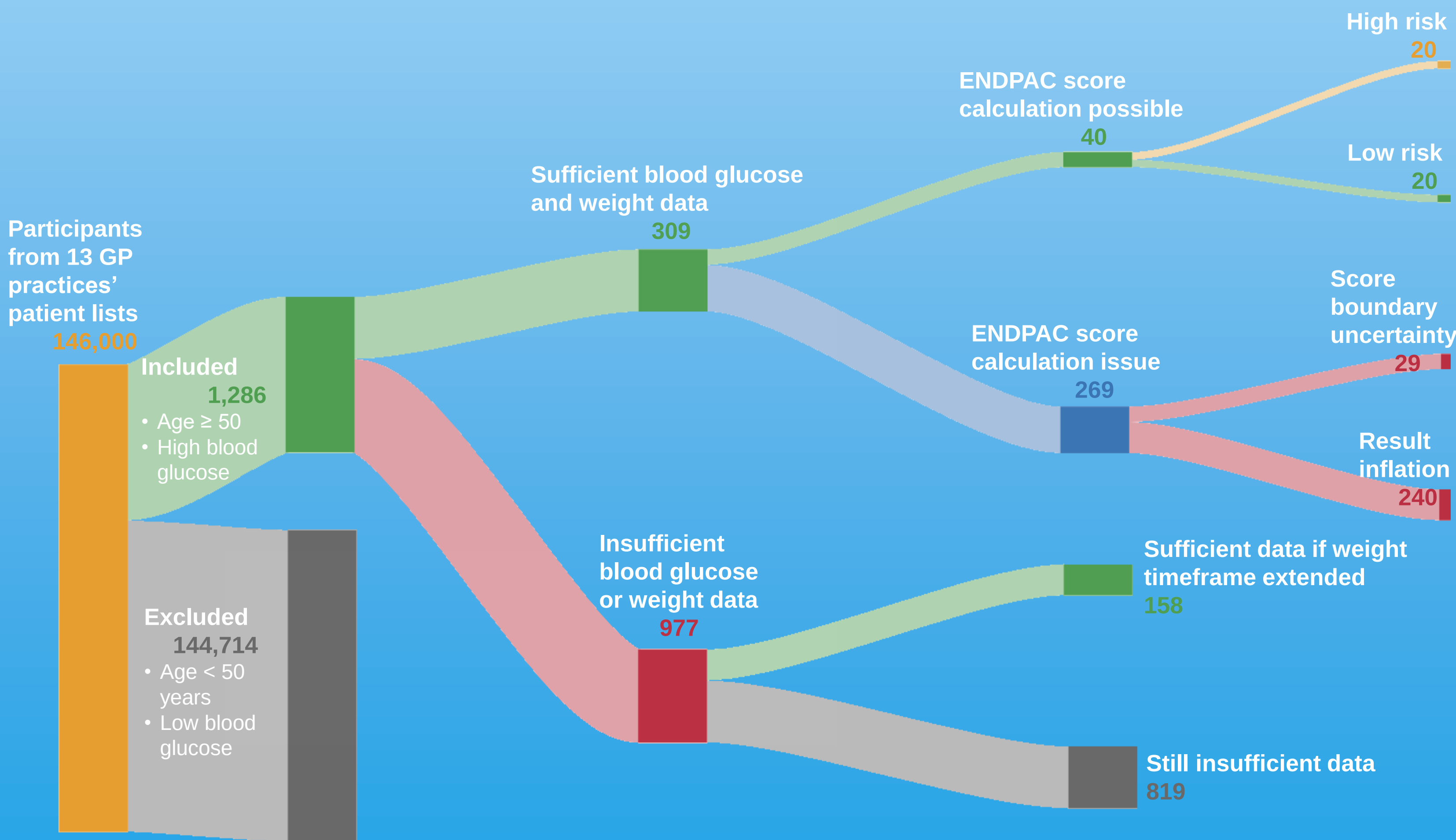


Figure 2: Sankey diagram showing the flow of data through DEFEND PRIME analysis stages. Please note that due to presentation considerations node proportions are not to scale.

5 What does this mean?

The Good News



The extraction software worked correctly and **successfully extracted valid data** as confirmed by the processing software.



24 % of participants (309/1,286) had enough blood glucose and weight data for an **ENDPAC risk score** to be calculated.



If the weight result inclusion timeframe is expanded, a further 12 % (158/1,286) would have **sufficient data** for ENDPAC score calculation.

The Bad News



The required conversion from the UK's blood glucose measurements of glycated haemoglobin (HbA1c) to the US model's estimated average glucose (eAG) causes **compatibility issues** with the ENDPAC model and UK primary care data.



87 % of participants with sufficient blood glucose and weight data (269/309) had an ENDPAC **score calculation issue** due to the conversion.



Of these, HbA1c **results were inflated** in 89 % (240/269) meaning no score could be calculated, and 11 % (29/269) straddled two or more **risk score boundaries** due to blood glucose **result uncertainty**.

6 What's next?



Validate extending the weight result timeframe to ascertain if this accurately identifies more cases of pancreatic cancer.



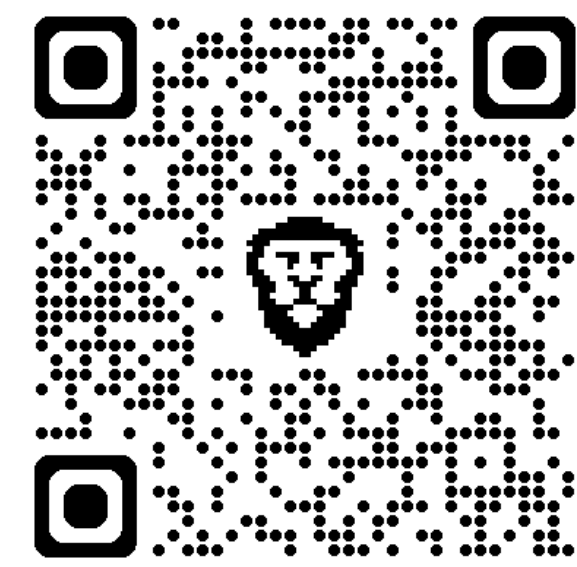
Quantify the actual impact of blood glucose conversion on ENDPAC score calculation and develop method to calculate confidence intervals for ENDPAC scores.



Findings from DEFEND PRIME are informing the development of an **NHS intervention** to improve early diagnosis of pancreatic cancer.

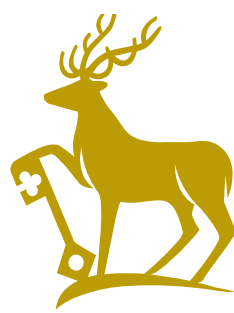


Want to know more?
Scan the QR code to access the DEFEND PRIME study website:



References

1. Sung H. *et al.* Global Cancer Statistics 2020: GLOBOCAN Estimates of Incidence and Mortality Worldwide for 36 Cancers in 185 Countries. *CA: A Cancer Journal for Clinicians*. 2021;71(3):209-249. doi:10.3322/caac.21660
2. Santos R. *et al.* Clinical Prediction Models for Pancreatic Cancer in General and At-Risk Populations: A Systematic Review. *Am J Gastroenterol*. Published online September 21, 2022. doi:10.14309/ajg.0000000000002022
3. Sharma A, Kandlakunta H, Nagpal SJS, *et al.* Model to Determine Risk of Pancreatic Cancer in Patients With New-Onset Diabetes. *Gastroenterology*. 2018;155(3):730-739.e3. doi:10.1053/j.gastro.2018.05.023
4. Claridge H. *et al.* Determining the feasibility of calculating pancreatic cancer risk scores for people with new-onset diabetes in primary care (DEFEND PRIME): study protocol. *BMJ Open*. 2024;14:e079863. doi: 10.1136/bmjopen-2023-079863



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