Using automated data extraction methods to understand the evolution of insulin prescribing in the UK between 2021–2022

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INTRODUCTION

- Diabetes has a substantial global impact affecting patients and healthcare systems worldwide. The International Diabetes Federation reports that 10.5% of the adult population has diabetes, which is expected to increase by 46% by 2045.[1] Despite efforts from pharmaceutical companies and healthcare systems to effectively manage diabetes, patients are at risk of increased mortality, clinical complications and general deterioration of their quality of life[1–5]

- In the previous decade, global diabetes expenditure has increased by 107%.[1] Given the ever-increasing prevalence of diabetes and the deterioration of patient prognosis, healthcare systems worldwide must ensure optimal and timely patient access

- The landscape of insulin prescribing in the UK faces a multitude of challenges, including the unprecedented strain on the National Health Service (NHS) due to the socioeconomic impact of the COVID-19 pandemic and disruptions in the global supply chain, impacting the NHS in granting access to insulin treatments

- Leveraging prescription information from open-access databases has the potential to enhance the efficiency of insulin access and diabetes care. Analysis of insulin prescription data can help identify key trends and patterns that help drive evidence-based decisions that can benefit patients and the healthcare systems

- However, information of this type exists in large datasets; the manual analysis of such datasets presents significant challenges regarding the extensive time required to conduct the analysis, the introduction of human error, and the potential of overlooking valuable insights due to the volume of data present

- The objective of this research is to evaluate the evolution of insulin prescribing between January 2021 and December 2022 in the UK using automated extraction of large datasets

METHODS

- This study was a retrospective analysis of publicly available monthly insulin prescription data from the English Prescribing Dataset (EPD) obtained from the NHS Business Services Authority Open Data Portal

- The British National Formulary was used to first determine different insulin types/products available on the NHS; 19 insulin types and 19 insulin products were identified for this study

- An automated process utilising the Python package 'panda' was used to detect and extract prescriptions that contained the predefined insulin types/product names

- After extraction of the monthly insulin prescription data, all records were combined to create a comprehensive dataset of prescriptions from January 2021 to December 2022 (Figure 1)

- To determine the overall counts of insulin prescriptions across the 2-year timeline, data were grouped by year and month values and the total sum calculated

- Data were imported into the Microsoft PowerBI platform, which allowed the automatic generation of interactive charts and graphs for visual representation of the data

Figure 1. Schematic representation of the automated data analysis
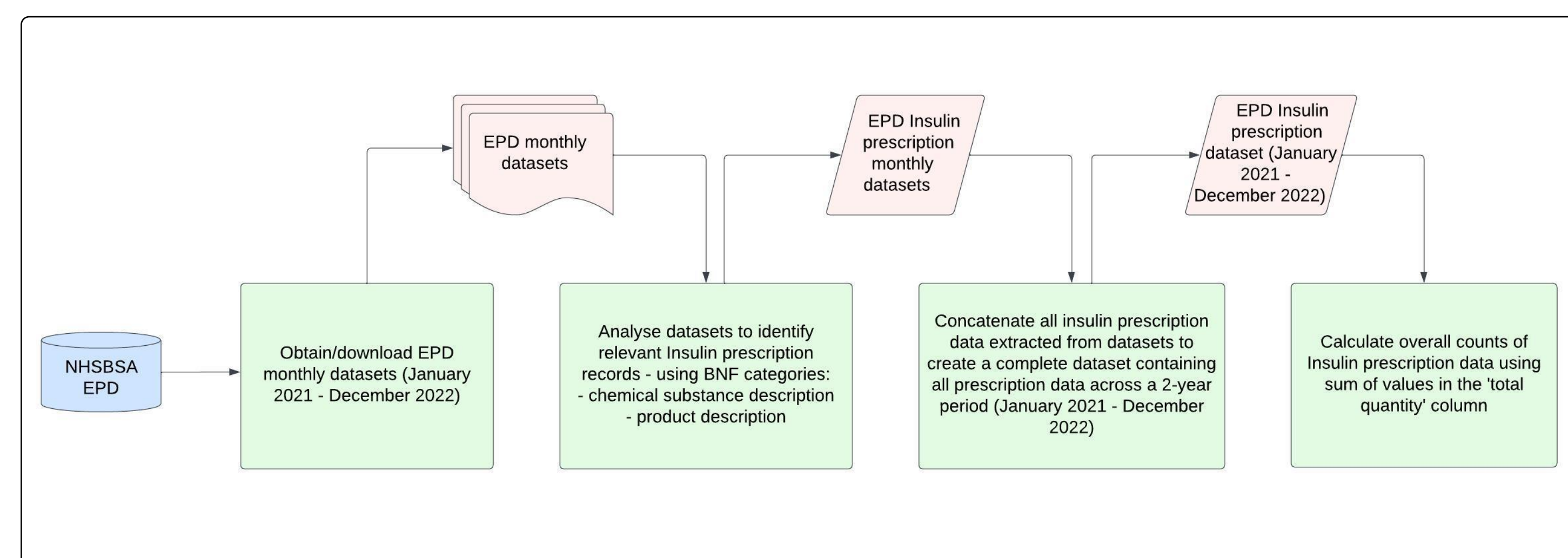
BNF, British National Formulary; EPD, English Prescribing Dataset; NHSBSA, National Health Service Business Services Authority

RESULTS

- Approximately 17 million records were identified in each monthly dataset; identification and extraction of relevant insulin prescriptions took approximately 80 minutes

- Prescription data was transferred to the Microsoft PowerBI platform, where it was automatically extrapolated and presented as interactive graphs/pie charts; this enabled a fast visual representation of the prescription information. The platform also allowed for easy data manipulation; thus, data could be quickly categorised based on points of interest

- Key observations of insulin prescriptions between January 2021 and December 2022 include:

  - An overall increase (11.8%) in insulin prescriptions across the UK (Figure 2)

  - Across regions, the Midlands had the highest total quantity of insulin products prescribed (20.6%) followed by the North East and Yorkshire (17.0%) (Figure 3)

  - In the UK, insulin aspart was the most prescribed product (32.0%) (Figure 4), and NovoRapid by Novo Nordisk had the largest market share among insulin manufacturers
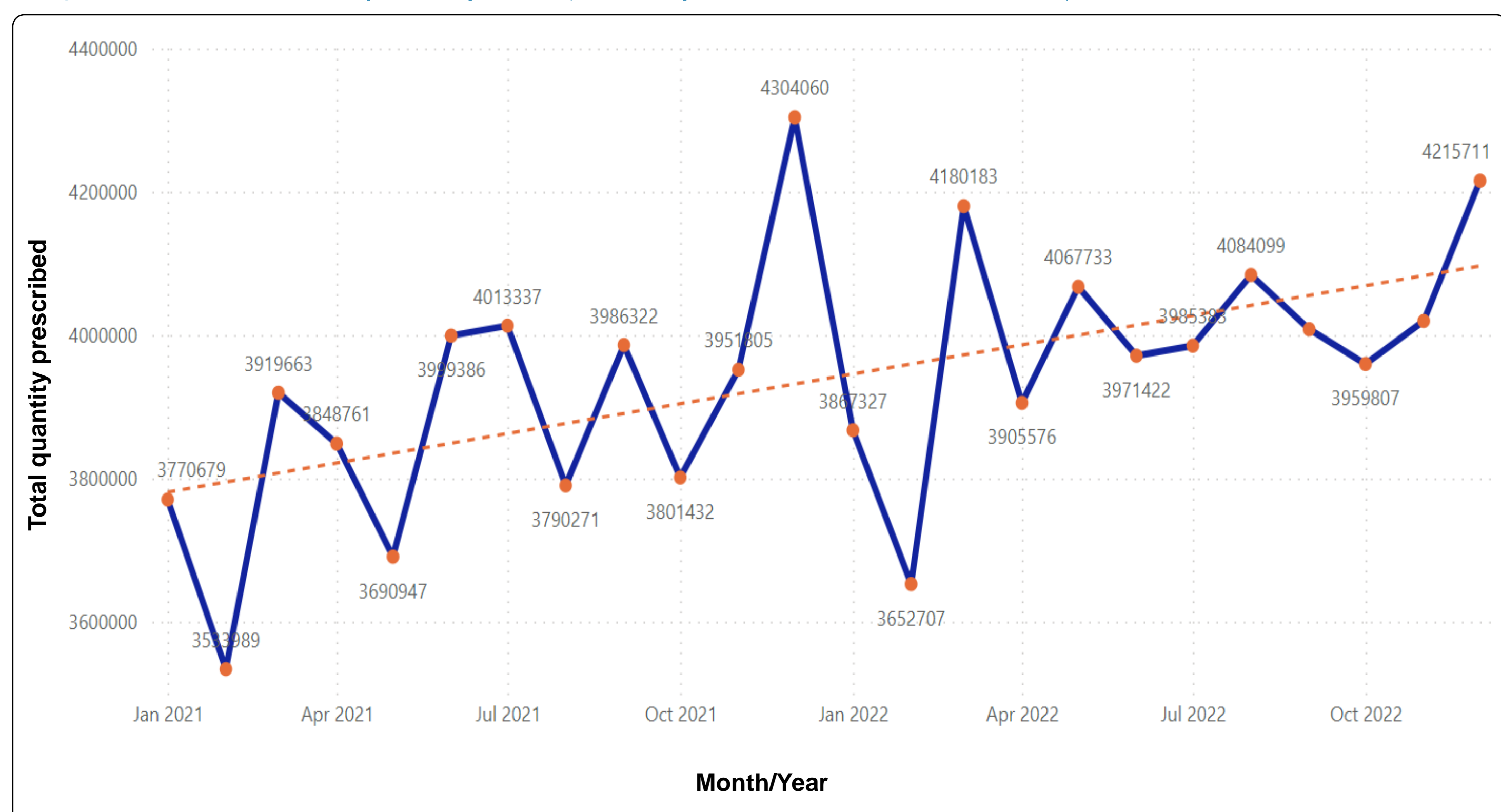
Figure 3. Insulin prescriptions (total quantity prescribed) by England region

Figure 2. Total insulin prescriptions (January 2021–December 2022)
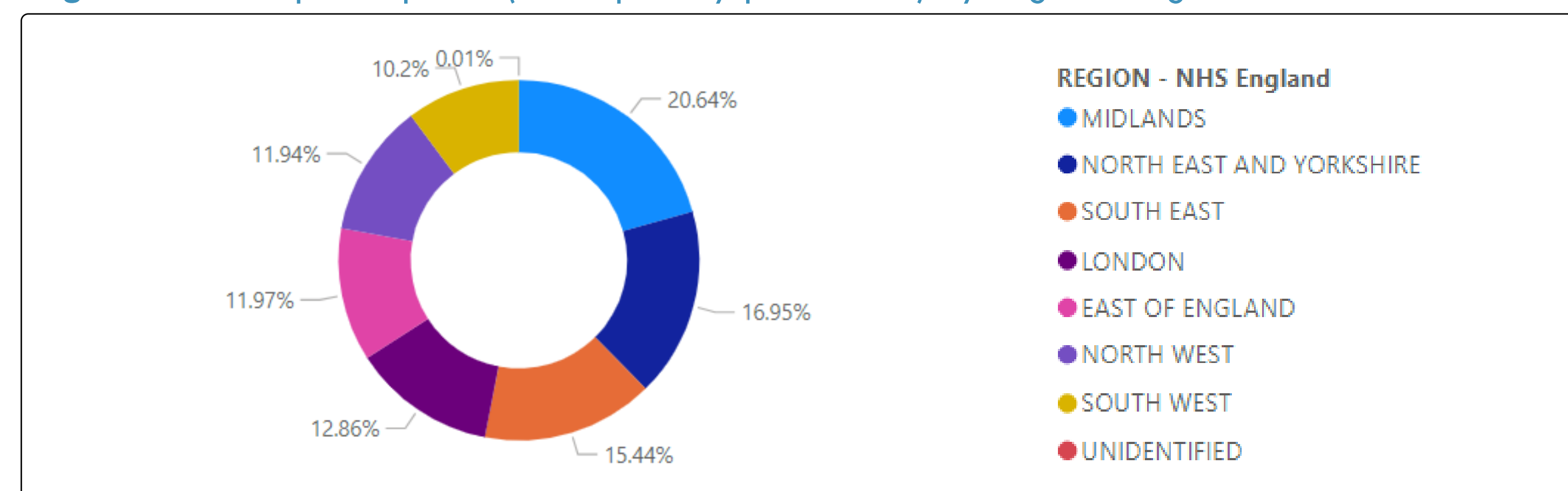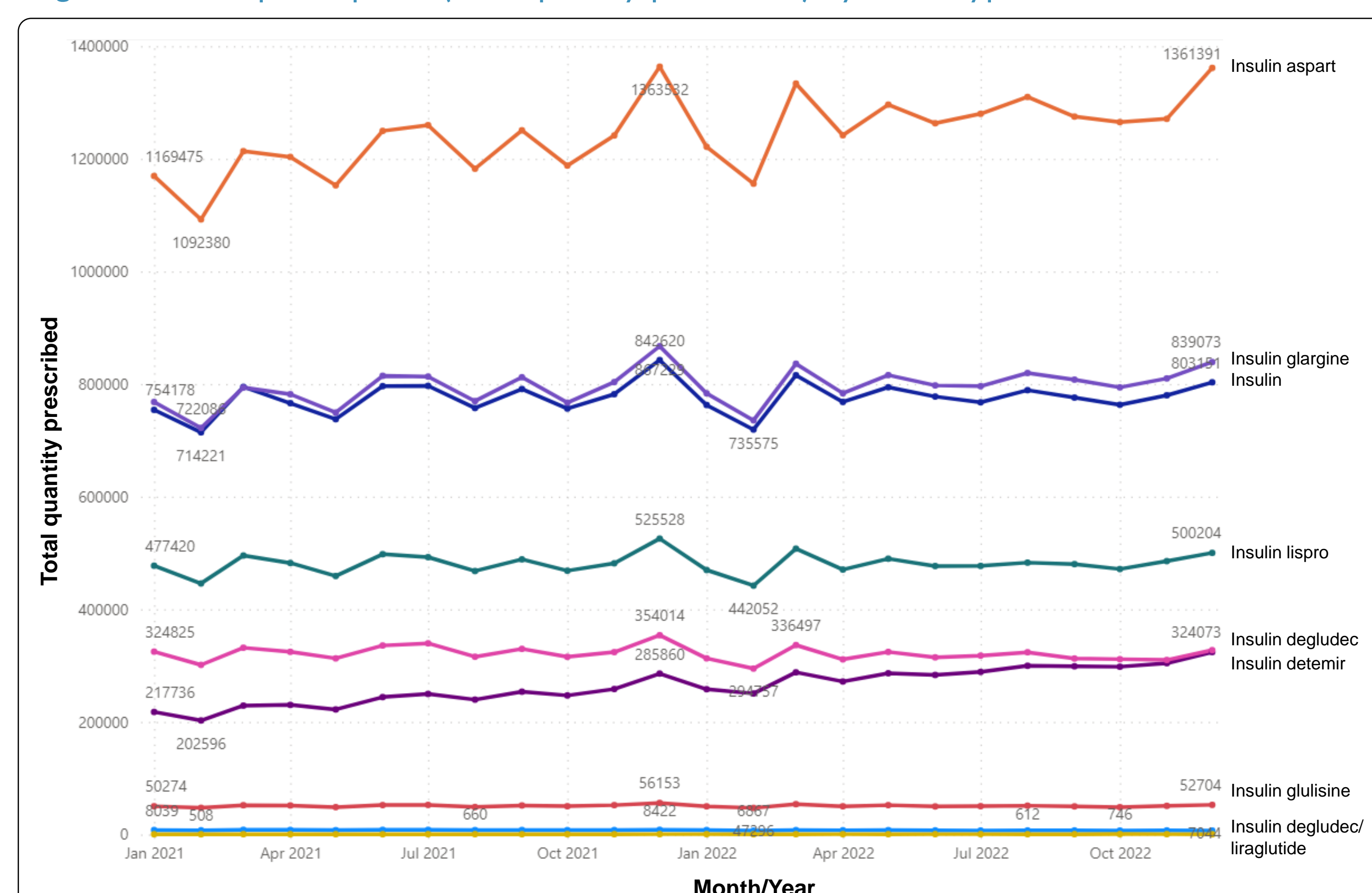

Figure 4. Insulin prescriptions (total quantity prescribed) by insulin type

DISCUSSION

- Analysis of the data highlighted that insulin prescriptions in the UK increased from January 2021 to December 2022; this trend could be attributed to the increase in diabetes documented after COVID-19 infection,[6] general epidemiological trends[1] and potential backlog of undiagnosed patients due to COVID-19. These data suggests that insulin prescriptions may continue to increase

- The datasets in this study could not have been analysed manually due to the large volume of insulin prescriptions identified; this highlights the necessity for automated methods that can utilise open-access databases to spot trends and/or abnormalities in healthcare data

- Examination of real-world healthcare data is important for payers to understand drug utilisation in their markets and make informed, evidence-based decisions based on data trends; automated IT solutions to identify, extract and analyse complex datasets in a short period of time could be of interest to payers who wish to conduct real-world patient monitoring and improve resource allocation and patient access to treatments

CONCLUSIONS

- The trends in insulin prescribing can be attributed to several reasons, including the potential backlog of undiagnosed patients due to COVID-19 and the rise in the diabetic population post COVID-19

- Leveraging automated extraction methods and analysing comprehensive prescription datasets provides payers with insights to allow informed decision making regarding resource allocation to improve diabetes care and patient access

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