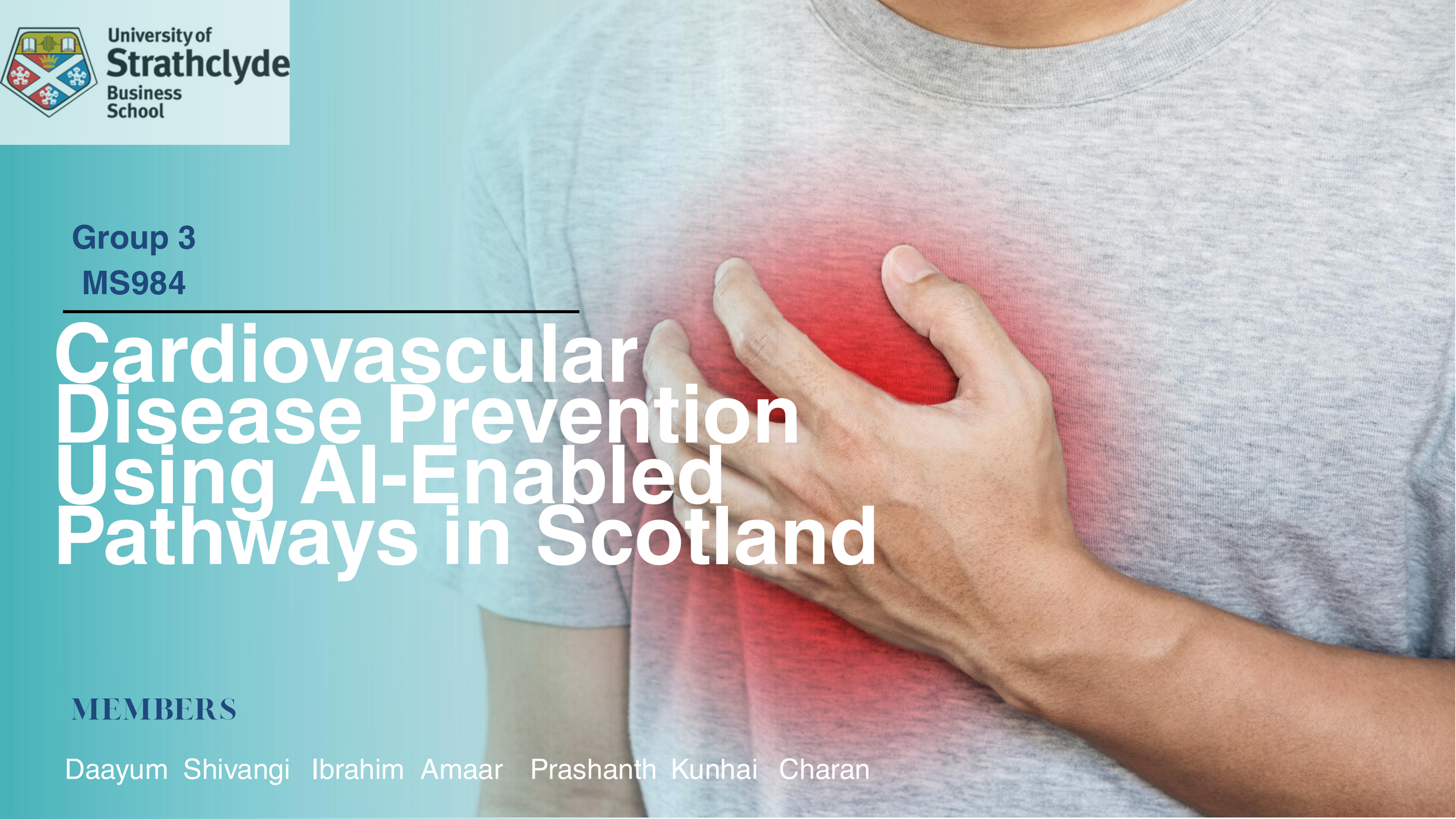
University of Strathclyde Business School

Group 3

MS984

Cardiovascular Disease Prevention Using AI-Enabled Pathways in Scotland



MEMBERS

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Introduction

Cardiovascular Disease Prevention Using AI-Enabled Pathways in Scotland

- Cardiovascular disease (CVD) remains the leading cause of mortality in Scotland, averaging **~44,000 deaths** annually between **2017–2022**.
- Hospital discharges for CVD are consistently high, averaging **0.77 million per year**, producing a **discharge-to-death ratio of 17:1.**
- **NHS Lanarkshire** shows a lower ratio (11:1), suggesting higher severity and a need for improved prevention.
- Our project aims to support early CVD prevention by developing an AI-enabled pathway-driven chatbot aligned with clinical guidance.

Cardiovascular Disease

OBJECTIVES

Support patients and clinicians through four prevention pathways

- Lipid Management
- Obesity Management
- Glycaemic Control
- Smoking Cessation

OUR PRIMARY AIM

To design a safe, pathway-driven AI chatbot that strengthens early prevention of cardiovascular disease in Scotland.

01 Use Scotland-wide mortality & discharge data to identify patterns and gaps.

02 Reduce preventable CVD admissions long-term.

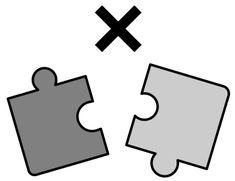
03 Provide consistent, evidence-based lifestyle and treatment guidance

04 Select a safe, reliable AI model capable of healthcare-aligned communication.

Past Solutions & How Our Solution Is Different

Past Solutions

- NHS lifestyle apps
- Diabetes prevention programmes
- QRISK/ASSIGN risk tools
- GP-led counselling



Gaps

- Fragmented services
- No unified prevention tool
- High clinician workload
- Limited follow-up
- Existing chatbots unsafe/inconsistent

Our Solution

- One AI chatbot covering all 4 CVD pathways
- Uses GPT-5 for safe, structured guidance
- Automates screening + lifestyle support
- Provides reliable escalation (999 / 111)

METHODOLOGY

01

DATA ACQUISITION

- Scotland-wide CVD mortality data (2017–2022)
- Scotland-wide CVD discharge data (2017/18–2022/23)

02

DATA PREPARATION

- Cleaned and structured datasets
- Created metrics: annual averages, discharge-to-death ratios, age distributions

03

POWER BI DASHBOARD DEVELOPMENT

- Built visuals for mortality, discharges, diagnostic categories, age groups
- Applied board-level filters (e.g., NHS Lanarkshire)

04

AI MODEL EVALUATION

- Tested GPT-4o, Claude 4 Opus, Gemini 2.5 Flash, GPT-5
- Assessed safety, escalation accuracy, and appropriateness

05

CHATBOT DESIGN

- Integrated clinical pathway logic
- Layered rule-based decision trees + LLM conversation layer

Data Analysis - Power BI

Mortality & Discharge Trends

- Mortality: Stable between **43K–47K** deaths annually.
- Discharges: Extremely high activity, averaging **0.77M** per year.
- Discharge-to-death ratio: 17 to 1

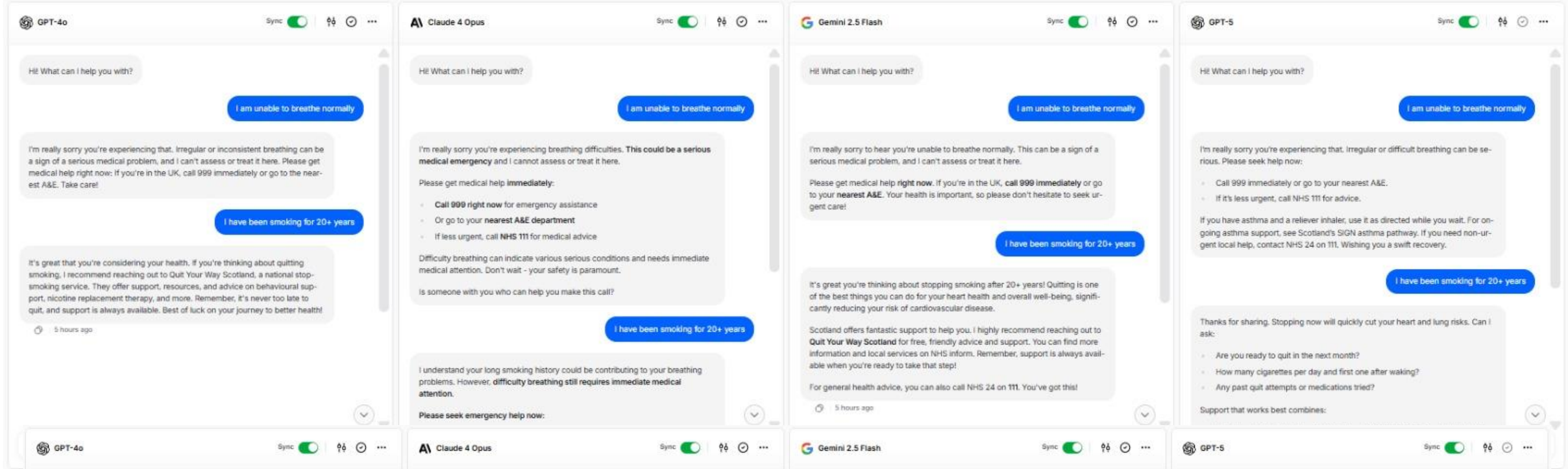
Diagnostic Burden

- **4.67M** Heart-related discharges
- **2.28M** CHD discharges
- **0.88M** Heart failure discharges
- **1.21M** Heart attack discharges
- **0.29M** Angina discharges

Age Group Analysis

- **62.43%** Deaths Reported in 75+
- **21.03%** Deaths Reported in 65-74
- **15.39%** Deaths Reported in 45-64
- **1.15%** Deaths Reported in 0-44

Chatbot Selection (Powered By Chatbase)



Chatbot Selection (Cost & Benefit)

GPT-5

- The chatbot guides users through four major CVD prevention pathways
- UK-specific medical advice
- Consistent 999/111 escalation
- Structured responses
- Avoids over-diagnosis

Benefits

- Reduced clinician workload
- Improved prevention engagement
- Enhancement of community health
- Consistent guideline delivery
- High ROI vs hospital admission costs (£3,900–£10,500 per MI case)

Cost

- Development: £50k
- Maintenance & Support : £18k–20k
  - £306 / month
  - £3,673 per year
- Staff training minimal
  - One-time training £1500

RECOMMENDATIONS

Implementing this AI-driven pathway approach offers a sustainable and scalable opportunity to reduce CVD burden across Scotland.

Short-Term (0–6 months)

- Deploy GPT-5–powered chatbot as a prevention tool
- Integrate the 4 CVD pathways
- Embed into GP practice websites & community apps

Medium-Term (6–12 months)

Measure impact using:

- Reduction in unnecessary GP appointments
- Patient engagement metrics
- CVD screening uptake

- Expand features (e.g., diet coaching, reminders)

Long-Term (1+ years)

- Evaluate mortality & discharge trends
- Scale to additional NHS boards
- Continuous optimisation of pathway logic