Hard to reach populations- Frailty

Katie Hards
Lead Diabetes Nurse
Oxford University Hospital Trust
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Declarations of interest

- Speaker fees from SBK, Insulet

Outline of this talk

➢ Frailty in people with diabetes

➢ Holistic approach to people with T1D

➢ Individualised HbA1c targets

➢ Hypoglycaemia risk in older adults

➢ Available diabetes technologies and emerging evidence on their

benefits in frail/vulnerable people

➢ Barriers to adopting diabetes technology

➢ It is possible to start HCL in older or young frail people with diabetes

Key barriers to the use of diabetes technology in older people

Maltese et al. Diabetologia 2024

Definition

- Frailty' is a term that's used a lot, but is often misunderstood. When used properly, it refers to a person's mental and physical resilience, or their ability to bounce back and recover from events like illness and injury.
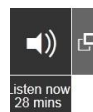
Age UK

Preconceptions

- It is not safe
- It is too difficult
- It is not possible

It is not our job

"They" will never manage

Autism and Learning Difficulties

NHS
Oxford University Hospitals
NHS Foundation Trust

IF YOU ALWAYS DO WHAT YOU'VE ALWAYS DONE, YOU'LL ALWAYS GET WHAT YOU'VE ALWAYS GOT

Henry Ford

Victory comes from finding opportunities in problems.

Sun Tzu

1920s Insulin discovered

1980s 1st commercialized SubQ insulin pump

2006 Sensor augmented pump (SAP)

2013 / 2015 LGS / PLGS SAP

2014 1st major dual hormone HCL study

2019 Commercialized HCL (Control IQ)

2020 1st CE mark in dual hormone system (Inreda APS)

1960s 1st IV Insulin pump

1999 1st CGM

Late 2000s Labtop based closed-loop studies

2013 1st smartphone based HCL study

2016 Commercialized HCL (Minimed 670G)

2020 Commercialized HCL (CamAPS FX)

2020 Commercialized AHCL (Minimed 780G)

Insulin Glucagon

Patient JL, 15 pounds   December 7, 1922   Patient JL, 30 pounds   February 26, 1923

ONE LILLY ASEPTIC GLASS ILETIN SYRINGE No. 230
ELI LILLY AND COMPANY, INDIANAPOLIS, U.S.A.

How To Mix Insulin

CLOUDY — air in the cloudy
CLEAR — air in the clear
CLEAR — draw up the clear
CLOUDY — draw up the cloudy

NPH   Regular   Regular   NPH

STEP 1   STEP 2   STEP 3   STEP 4
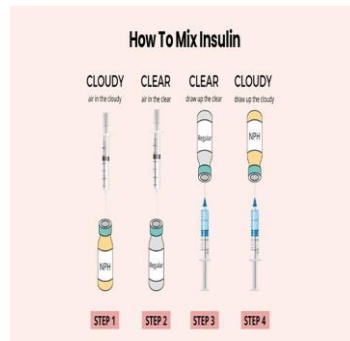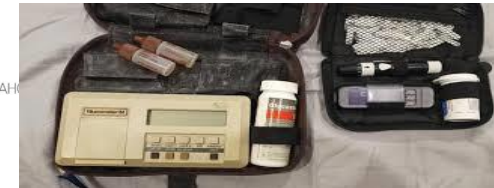
Type 1 Diabetes in Older People Has Nearly Tripled Globally Since the '90s

— But the increase marks good news for survival, study suggests

by Kristen Monaco, Senior Staff Writer, MedPage Today
June 13, 2024

Global burden of type 1 diabetes in adults aged 65 years and older, 1990-2019: population based study

Kaijie Yang,[1] Xue Yang,[1] Chenye Jin,[2] Shuangning Ding,[1] Tingting Liu,[1] Bing Ma,[3] Hao Sun,[3] Jing Zhang,[4] Yongze Li[1]
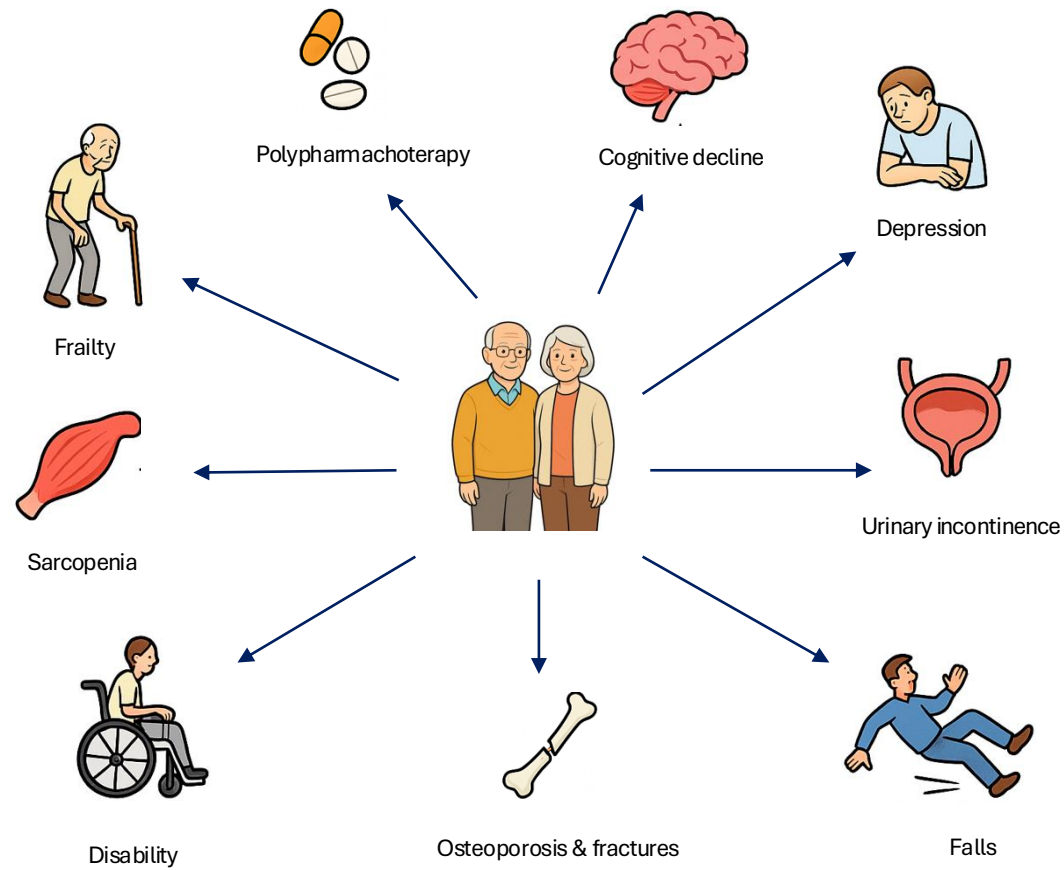
- **Objectives** - To estimate the burden, trends, and inequalities of type 1 diabetes mellitus (T1DM) among older adults at global, regional, and national level from 1990 to 2019.

- **Design** - Population based study

- **Population** - adults aged ≥65 years from 21 regions and 204 countries and territories (Global Burden of Disease and Risk Factors Study 2019) from 1990 to 2019.

- **Primary outcomes** were T1DM related age standardised prevalence, mortality, disability adjusted life years (DALYs), and average annual percentage change.
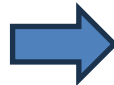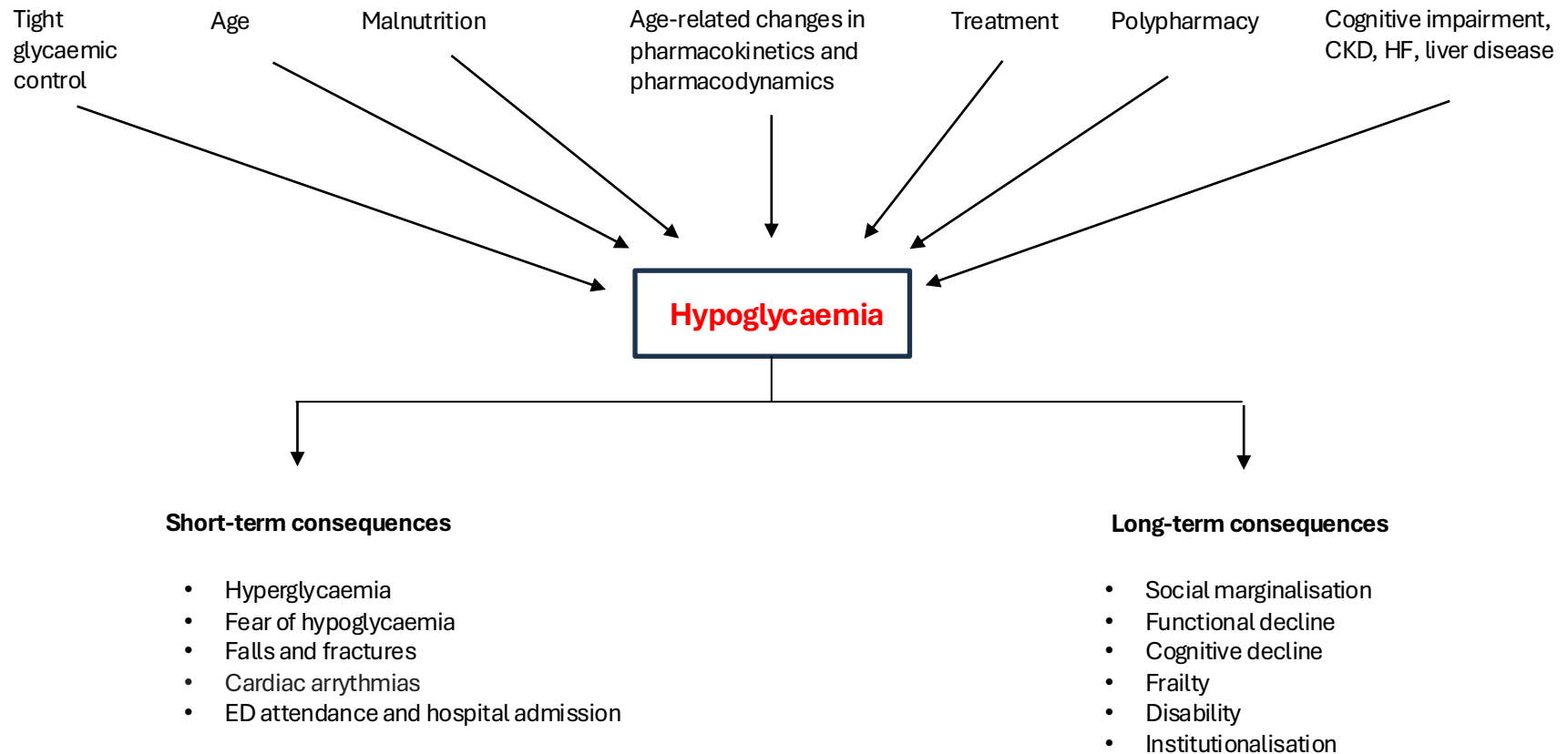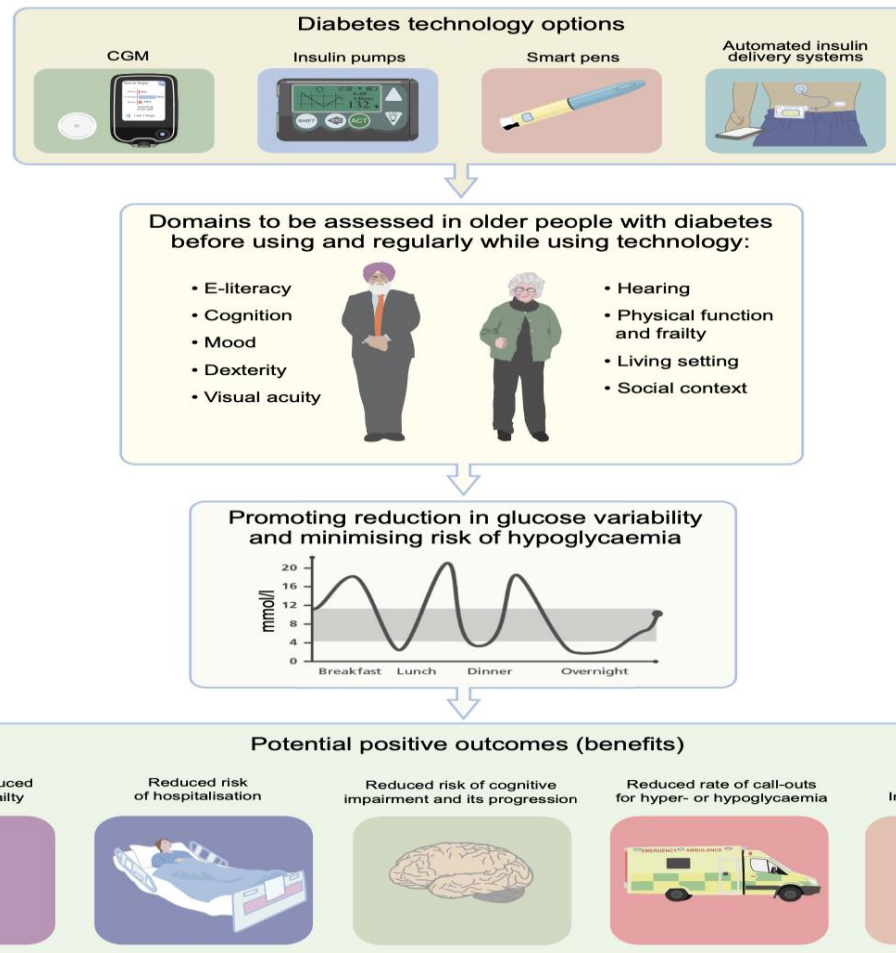
Key findings

- Globally, between 1990 and 2019, the number of people with T1D aged ≥65 years increased from 1.3 million to 3.7 million

- The age standardised prevalence rate of T1D among this age group increased by 28%

- The age standardised mortality significantly decreased by 25%

- The age standardised DALYs decreased by 8.8%

- Mortality fell 13 times faster in countries with a high sociodemographic index versus countries with a low-middle sociodemographic index

Type 1 diabetes and age-associated conditions

Hypoglycaemia in older people with diabetes

Tight glycaemic control

Age

Malnutrition

Age-related changes in pharmacokinetics and pharmacodynamics

Treatment

Polypharmacy

Cognitive impairment, CKD, HF, liver disease

Hypoglycaemia

Short-term consequences

- Hyperglycaemia
- Fear of hypoglycaemia
- Falls and fractures
- Cardiac arrythmias
- ED attendance and hospital admission

Long-term consequences

- Social marginalisation
- Functional decline
- Cognitive decline
- Frailty
- Disability
- Institutionalisation

Maltese et al. Diabetologia 2024

NICE National Institute for Health and Care Excellence

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Hybrid closed loop systems for managing blood glucose levels in type 1 diabetes

Technology appraisal guidance | TA943 | Published: 19 December 2023

1.5 Only use HCL systems if the person or their carer:

1 Recommendations

- is able to use them, and

- is offered approved face-to-face or digital structured education programmes, or

- is competent in insulin dosing and adjustments.

Would you start HCL?

We did ☺ and here are the results and the story

Case studies

Bill

68 man

T1dm for >50 years

Brain injury in 1997

Relies on DN team for insulin administration

High Variability in glucose – HbA1c 99mmol/mol

Many insulin combinations tried

Dementia

Lives independently with support and a package of care

John

39m young man

Brain injury at age 15, due to DKA

T1dm since childhood

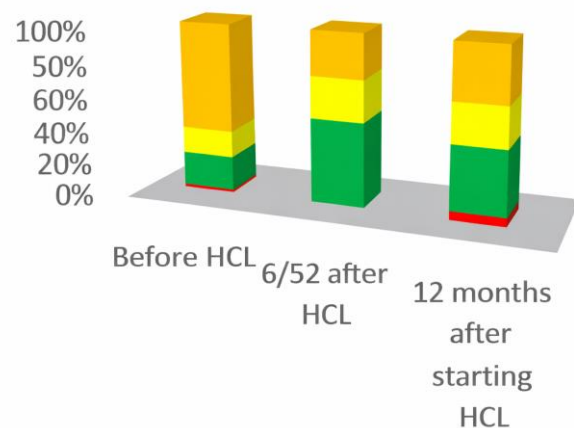Formally as assessed as having no capacity

Full time funded care

Time In Range at 30%

HbA1c High @ 74mmol/mol

Bills Change in TIR
January 2026

Before HCL   6/52 after HCL   12 months after starting HCL

- <3.9mmol/l
- 3.9-10mmol/l
- 10-13.9mmol/l
- <13.9mmol/l

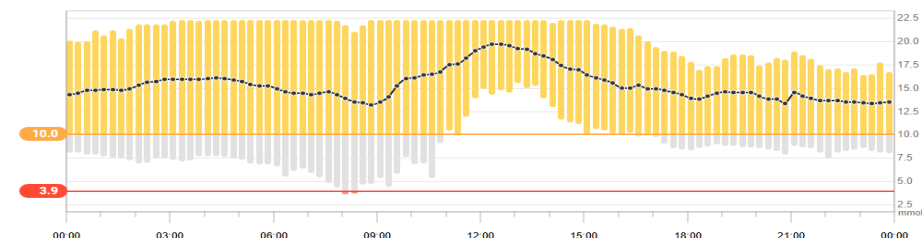**HbA1c**
99 mmol/l in December 2024
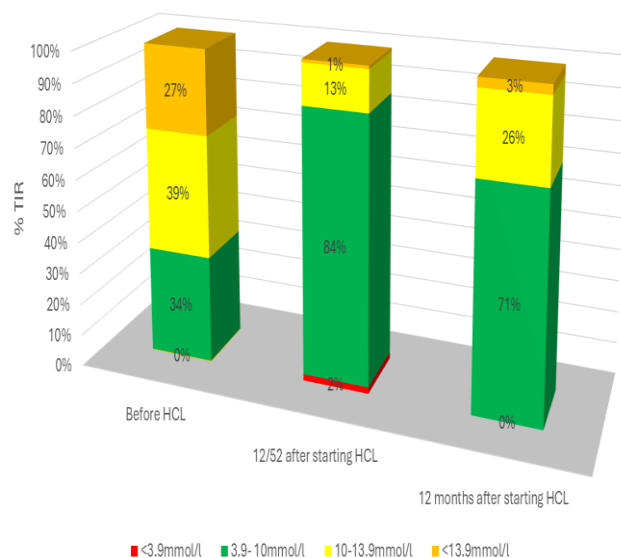74 mmol/l in July 2025
76 mmol/l in November 2025

December 2024

This graph shows your data averaged over 12 days

John's Change in TIR

HbA1c
74 mmol/mol in September 2024
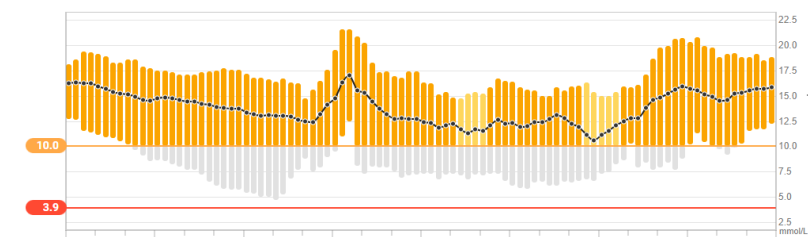58mmol/mol July 2025
59mmol/mol January 2026

January 2026

September 2024

How

Collaboration and trust – DN /carers

Tech learning – Glooko/Dexcom/DTN

Ongoing review

Data generation

Workforce – diversify – within existing workforce

Assistant Practitioner in HCL process who identify people who are vulnerable and frail

AP worked with carers and DN teams as a constant within an agreed action plan lead by the DSN

Has led to reduced unpredictability in visits and cost to DN service
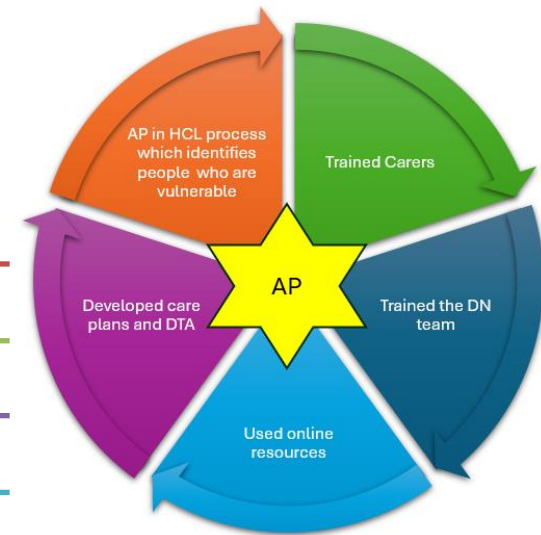
Summary of HCL Starts in Frail or Vulnerable People

Cohort Summary

Item	Number
Total people started	15
Additional starts planned	3
– With DN input	1
– About to start	2
Deaths	2
Unsuccessful staying on HCL	2
Age range	30–82 years

Vulnerability / Support Needs

Category	Number
Carers delivering insulin	1
Living with parents (Down syndrome)	1
Blind	2
Neurodiversity	4
Age and frailty	4

Diabetes Technology Used

System	Details
Omnipod 5	Libre 2+ and Dexcom
Medtronic	Guardian 4
Tandem	Dexcom

Clinical Outcomes (HbA1c)

Outcome	Number
HbA1c reduction >10 mmol/mol	4
HbA1c reduction >5 mmol/mol	2
Stable HbA1c	Not specified

Deaths not due to diabetes emergencies

Feedback from Bills DN team

I was very apprehensive about the changes to Bills visits at the beginning and the two visits a day. It was a new idea. We have received great support from yourself and Meg and feel I feel reassured now when visiting that we can contact you for the support if needed. The changes to Bill have been positive & he is more stable than he was before we started. We have also managed to change his daily routine for the better because of this as he will stay up until we visit again in the afternoon (on most occasions he will!)

There was some anxiety at the beginning and before the system was implemented. Bills cbgs are now more stable and pt safety is much improved.

There are still some anxieties around the system still and we are still working on upskilling the team which is a work in progress. I think we have found safety work arounds doing changes on weekend days etc.

Feedback from John and his care team

- A huge thank you to you, Katie and the team at OCDEM for your support with moving John onto a sensor and lately an insulin pump.
- John said: " I really appreciate the regular visits from Charlotte. She has really got to know me and all the advice she gives is brilliant. She gives my team all the help they need to support me. I feel happy because she is with me"
- John's team: "Charlotte is always very warm, welcoming, informative and open to discuss. She is always there to answer questions. She gives quick responses to email queries. She has been very good at co-working with the team and understanding the challenges John can keep out of sight."
-
- '"We appreciate having the clinical expertise from Katie and the whole team and helpline /registrar".
- The introduction of a sensor, which took a good amount of time for John and his 24hr team to get used to and recently the insulin pump have had a life changing impact on John's health. His cardiology and eye health. He now has good habits and his diabetic management is much more integrated. His behaviours (hiding sweet treats / secret eating) remain present but less impactful.
-
- The education for the team (training each person as if they have type one diabetes) has been transformative.
- The flexibility of approach has been so beneficial, with trying different sensors and also in working to a timeframe which John and the team could follow. Digesting new stages and information as it became available.

Take Home Messages

- Improved life expectancy in people with type 1 diabetes comes with a greater burden of age-related comorbidities, which influence diabetes management and shape therapeutic goals

- Frailty is associated with adverse outcomes, both generic and diabetes-specific, including hypoglycaemia, hospitalisation, and loss of independence

- Hypoglycaemia remains a major threat in older adults with type 1 diabetes; liberalising HbA_1c targets alone does not eliminate the risk

- Diabetes technology can significantly reduce time below range and improve time in range, enhancing safety and quality of life

- However, barriers persist, including frailty itself, the need for support with device use, and limited evidence in the most vulnerable populations.

Thank you for listening

References

- Age UK   https://www.ageuk.org.uk/our-impact/policy-research/frailty-in-older-people/understanding-frailty/

- NICE TA 943 https://www.nice.org.uk/guidance/ta943

- Maltese G, McAuley SA, Trawley S, Sinclair AJ. Ageing well with diabetes: the role of technology. Diabetologia. 2024 Oct;67(10):2085-2102. doi: 10.1007/s00125-024-06240-2. Epub 2024 Aug 13. PMID: 39138689; PMCID: PMC11446974.

- Yang, K. *et al.* (2024) 'Global burden of type 1 diabetes in adults aged 65 years and older, 1990-2019: population based study', *BMJ*, 385, p. e078432. Available at: https://doi.org/10.1136/bmj-2023-078432.