The Discovery of Insulin to present day clinical care:
Collip and Colleagues, Complex Care, and Care in the Community

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The Discovery of Insulin to present day clinical care:
Collip and Colleagues, Complex Care, and Care in the Community

Structure

Burden of Diabetes
Brief History of Diabetes
Components of Diabetes Care
Caring for the Community
Conclusion

Acknowledgments: The public-domain images used, especially those from the UK Welcome History of Medicine Museum Collection and Lilly slides
Disclosures: There are no conflicts of interest to declare

Dedicated to my Colleagues- Past and Present
Number of people with diabetes
Aged 20–79 years globally and by IDF region
Number of adults with diabetes
Aged 20–79 years, 2021

Key messages

- Diabetes is a serious, chronic condition that occurs when the body cannot produce enough insulin or cannot effectively use the insulin it does produce.

- Type 1 diabetes is the major type of diabetes in childhood but can occur at any age. It cannot be prevented. People with type 1 diabetes require insulin to survive.

- Type 2 diabetes accounts for the vast majority (over 90%) of diabetes worldwide. Evidence exists that type 2 diabetes can be prevented or delayed, and there is accumulating evidence that remission of type 2 diabetes may sometimes be possible.

- "Prediabetes" is a term used increasingly to describe people with impaired glucose tolerance and/or impaired fasting glucose. It indicates a higher risk of developing type 2 diabetes and diabetes-related complications.

- Pregnant women with gestational diabetes can have babies that are large for gestational age, increasing the risk of pregnancy and birth complications for the mother and baby.
Facts about Type Diabetes

- 2021: 8.4 million people with T1D
- 1.5 million (18%) <20 years, 5.4 million (64%) were aged 20–59 years, and 1.6 million (19%) were aged 60 years or older.
- One fifth (1.8 million) were in low-income and lower-middle-income countries.
- Remaining life expectancy of a 10-year-old diagnosed with type 1 diabetes in 2021 ranged from a mean of 13 years in low-income countries to 65 years in high-income countries.
WHO estimate that 10% of the World’s Adult Population have Diabetes

<table>
<thead>
<tr>
<th>Global Area</th>
<th>Estimated Muslim Population</th>
<th>Proportion of Global Muslims</th>
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<tbody>
<tr>
<td>North America</td>
<td>3,480,000</td>
<td>0.2%</td>
</tr>
<tr>
<td>South America</td>
<td>840,000</td>
<td>&lt;0.1%</td>
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<tr>
<td>Europe</td>
<td>43,470,000</td>
<td>2.7%</td>
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<td>Middle East North Africa</td>
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<td>Sub-Sahara Africa</td>
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<tr>
<td>Asia Pacific</td>
<td>986,420,000</td>
<td>61.7%</td>
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</tbody>
</table>
IDF Data:
North American and Caribbean Region

Type 1 diabetes (0–19 years)
Number of children and adolescents with type 1 diabetes: 192,500
Number of newly diagnosed children and adolescents each year: 24,400

Top 5 countries for number of people with diabetes (20–79 years)

<table>
<thead>
<tr>
<th>Country</th>
<th>2011</th>
<th>2021</th>
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<tr>
<td>United States of America</td>
<td>23.7m</td>
<td>32.2m</td>
</tr>
<tr>
<td>Mexico</td>
<td>10.3m</td>
<td>14.1m</td>
</tr>
<tr>
<td>Canada</td>
<td>2.7m</td>
<td>3m</td>
</tr>
<tr>
<td>Haiti</td>
<td>295,500</td>
<td>548,700</td>
</tr>
<tr>
<td>Jamaica</td>
<td>258,500</td>
<td>231,100</td>
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Highlights

- 1 in 7 adults have diabetes – 51 million.
- The North America and Caribbean Region has the second highest diabetes prevalence (14%) of all IDF Regions.
- 1 in 4 people living with diabetes are undiagnosed.
- The North America and Caribbean Region has the highest diabetes-related expenditure (USD 415 billion) associated with diabetes, 43% of global expenditure.
- The North America and Caribbean Region has the second highest number of children and adolescents with type 1 diabetes – 193,000 in total.
- The North America and Caribbean Region has the highest average cost per person with diabetes (20-79y) – USD 8,208.
- 1 in 6 live births are affected by hyperglycaemia in pregnancy.
Canadians: 30% live with diabetes or prediabetes; 10% have a diagnosis of diabetes 14% with undiagnosed). Estimated lifespan reduction 5 to 15 years. Double vs standardised mortality

Age-adjusted prevalence (5.0% in the general population):
- 17.2% among First Nations individuals living on reserve
- 10.3% among First Nations individuals living off-reserve
- 7.3% among Métis people
- 14.4% South Asian descent
- 12.9% African descent
- 9.4% Arab/West Asian descent
- 8.2% East/Southeast Asian descent
- South Asian and Black adults: x 8.1 times and x 6.6 times higher, vs White adults
- (13). Further, the prevalence of diabetes

Risk factors: Non-completion of high school x 5.2 vs University Educated. Unemployed x 2.9, food security, the built environment, social support, and access to health care

Potentially Modifiable risk factors:
- 46.2% of adults and 57.1% of youth are physically inactive
- 35.6% of adults overweight, 28.2% of adults obesity, 23.2% of youth overweight or obesity;
- 74.6% not eating enough fruits and vegetables
- 12.9% are current tobacco smokers
Indigenous women are at an elevated risk of diabetes in pregnancy in North America.

Cree communities in Quebec are a distinct First Nation (North American Indian) group characterised by the highest reported prevalence of diabetes in pregnancy in Canada—affecting 15%–18% of Cree mothers.

Both diabetes in pregnancy and infant hospitalisation rates were much higher comparing:
- Cree (23.7% and 29.0%)
- Other First Nations (12.4% and 34.1%)
- Non-Indigenous (5.9% and 15.5%) communities.

A Brief History of Insulin

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Hon Consultant in Endocrinology and Diabetes, Acute Medicine
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Based on John R. White. Diabetes Spectrum 2014 May; 27(2): 82-86
And other resources including Banting House Resources, London, Ontario, Canada
Diabetes Mellitus: A History

Ebers Papyrus and after
A disease characterised by the ‘too great emptying of urine’ finds its place in antiquity in Egyptian manuscripts dating back to 1500 B.C.

Indian physicians called it madhumeha (‘honey urine’) because it attracted ants. Sushruta, and the surgeon Charaka (400–500 A.D.) were able to identify the two types, later to be named Type I (young) and Type 2 diabetes (wealthy, older, larger).

Aretaeus the Cappadocian history attributes the first complete descriptions in the first century A.D. to him. Coined the word diabetes (Greek, ‘siphon’) and dramatically stated “… no essential part of the drink is absorbed by the body while great masses of the flesh are liquefied into urine”.

Avicenna (980–1037 A.D.), the great Persian physician, in The Canon of Medicine not only referred to abnormal appetite and observed diabetic gangrene but also concocted a mixture of seeds (lupin, fenugreek, zedoary) as a panacea.

John Rollo: The term mellitus (Latin, ‘sweet like honey’) by this British Surgeon-General in 1798, to distinguish this diabetes from diabetes insipidus in which the urine was tasteless.
Discovery of the role of the pancreas

Joseph von Mering and Oskar Minkowski in 1889 discovered the role of pancreas in diabetes. They found that dogs whose pancreas was removed developed all the signs and symptoms of diabetes and died shortly afterwards.

In 1910, Sir Edward Albert Sharpey-Schafer found that diabetes resulted from lack of insulin. He termed the chemical regulating blood sugar as insulin from the Latin “insula”, meaning island, in reference to the insulin-producing islets of Langerhans in the pancreas.

Starvation treatment

In 1919 Dr Frederick Allen of the Rockefeller Institute in New York published his “Total Dietary Regulations in the Treatment of Diabetes” that introduced a therapy of strict dieting or starvation treatment – as a way to manage diabetes.
Banting’s Original Idea

31 October 1920
• In the early hours of October 31, 1920, in London, Ontario, 28-year-old Dr. Frederick G. Banting woke up suddenly.
• He had had a flash of insight for a novel experiment to isolate the elusive internal secretion of the pancreas as a means of treating diabetes.
• Banting, had been reading about carbohydrate metabolism and diabetes.
• After a few hours of disturbed sleep, he awoke with a compelling idea that he quickly jotted down in a notebook.

The note made by Banting in the middle of the night. It reads: “Diabetus – Ligate pancreatic ducts of dog – Keep dogs alive till acini degenerate leaving Islets – Try to insolate the internal secretion of these to relieve glycosurea”

University of Toronto; The Discovery and Early Development of Insulin

? Just the two spelling mistakes?
A History of Insulin: Banting, Macleod, Best

• Before the 1920s, no effective pharmacological agents for T1DM or T2DM. T1DM was often a fatal malady
• Captain Dr. Frederick Banting, surgeon in World War I wounded by shrapnel (Military Cross)
• Toronto, Canada. Saw one patient in first month (seeking a prescription for ethanol), Banting embarked upon a career in academic medicine.
• Taught carbohydrate metabolism- led to interest in diabetes. He extracted matter from canine pancreas glands that had an impact on hyperglycaemia in other diabetic animals.
• While in Toronto for a friend’s wedding, Banting is able to secure a meeting with the head of physiology at the University of Toronto, Dr. John J. R. Macleod, to speak about his pancreatic extract idea.
• His student, Charles Best, worked on various extraction processes. December 1921, process via equal parts of ground-up beef pancreas and slightly acidic alcohol. Filtered, washed twice with toluene, and filter sterilized. This test solution was given to dogs to determine potency.
4 August 1921 –
• Dog #408 receives an injection of the extract, successfully dropping its blood glucose
• The dog remained in good condition.
• Banting and Best referred to their pancreatic extract as “Isletin” for the first time
• Dog #408 would eventually die of an infection, after successfully receiving injections for a number of hours.
• Banting and Best had learned much about “Isletin” and its anti-diabetic properties and were eager to send a report to Macleod.
A History of Insulin

- Leonard Thompson was the first patient to receive insulin. 14-year-old, weight 65 lb (29.5kg). Pale, smelled of acetone, was losing hair, had a distended abdomen, described as looking like the victim of a concentration camp. Charity patient.

- 11 January 1922, House Officer, Ed Jeffery, injected 7.5 ml of Banting and Best's extract (thick brown muck) into each buttock of the patient. Sterile abscess at the site of one injections.

- **Bit Missing here!**
- Push to perfect the extraction process and commercialize insulin was on. Banting's team entered into an agreement with Eli Lilly and Company, and, by July 1922, the first bottles of Lilly's Iletin (insulin) arrived in Banting's office.
- Insulin was commercially available in the United States by 1923.
Collip and the Missing Bit from most Histories of Insulin

- 11 January 1922… injected 7.5 ml of Banting and Best’s… extract (thick brown muck) into each buttock of the patient…

- Bit Missing here!

- … blood glucose dropped from .440 to .320. – 24.4 mmol/l to 17.8 mmol/l, urine glucose from 91.5g to 84g (per 24 hrs), Rothera ketones test strongly positive.

- “No clinical benefit was evidenced” - referenced to Banting, Best, Collip, Campbell, and Fletcher 1922** “another crushing defeat for Banting”**

- And Collip had not been allowed to supply the extract.

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Work on diabetes shows progress against disease
Toronto medical men hoping that cure is close at hand
A boy is treated
Effect of first treatment was so good that injections are continued

14 January 1922 – The press coverage begins.

** The Discovery of Insulin. Michael Bliss 1982.
Collip and the Missing Bit from most Histories of Insulin 2

• 11 January 1922….injected 7.5 ml of Banting and Best’s…… extract (“thick brown muck”) into each buttock of the patient…

• Bit Missing here!

• 20 December 2021: Banting and Best had tried oral extract on Dr Joe Gilchrist-failed. Then ‘failed for the seventh straight time to reduce an animal’s blood sugar’*

• 22 December 1921: Collip found that one of the extract-treated dogs had restoration of liver glycogen. And that his extract could relieve ketonuria.

• Collip: had shown restoration of two key metabolic defects in a dying diabetes dog versus just a glucose-lowering effect. Also that his extract induced severe hypoglycaemia- corrected by glucose injection in rabbits (“insulin shock”)

• 30 December 2021: Yale University presentation by Banting- criticism of experiments- including no temperature records- but verified that the extract had reduced glucose in at least 50% of the dogs tested

• Motivation for going for the clinical testing of the extract on a dying human.

Collip and the Missing Bit from most Histories of Insulin 3

- 11 January 1922 Banting and Best’s extract. And Collip had **not** been allowed to supply the extract. Collip continued to refine his extraction process. 16th Jan 1922- discovered that he could create an “alcohol trap” to refine the purification of insulin via its precipitation.

- 23 January 1922….second injection- this time Collip’s extraction. “The results were spectacular.”

<table>
<thead>
<tr>
<th>Extract</th>
<th>Banting &amp; Best</th>
<th>Collip</th>
</tr>
</thead>
<tbody>
<tr>
<td>Date of Injection</td>
<td>11 January 1922</td>
<td>23 January 1922</td>
</tr>
<tr>
<td>Blood Glucose</td>
<td>17.8 mmol/l</td>
<td>Normal (&lt;10mmol/l)</td>
</tr>
<tr>
<td>Rothera Ketones Test</td>
<td>Strongly Positive</td>
<td>Negative (Normal)</td>
</tr>
<tr>
<td>Urine Glucose</td>
<td>Strongly Positive</td>
<td>“almost disappeared”</td>
</tr>
<tr>
<td>Leonard Thompson</td>
<td>“No clinical benefit”</td>
<td>“visibly brightened…more active”</td>
</tr>
</tbody>
</table>

- Banting’s own words: **“These results were not as encouraging as those obtained by Zuelzer in 1908”***

**The Discovery of Insulin. Michael Bliss 1982.
***History of Insulin. Frederick Banting 19
The tragedy of Georg Ludwig Zülzer

- In 1908, in Germany Zülzer showed that pancreatic extracts could reduce the sugars and ketones in the urine of six diabetic patients.
- At least one of those patients came out of a diabetic coma. Calling his preparation “Acomatol”. But as supplies ran out, the patient died.
- Convinced of its effectiveness in treating diabetes, a patent was filed.
- Extracts had caused fever, shivering and vomiting in patients.
- In his patent application there was a technique to use alcohol to overcome this issue.
- Soon his preparations were causing no signs of fever, shivering or vomiting. But test animals became convulsive and sometimes slipped into a coma. This insulin was too pure!
- But with the outbreak of WW1 in 1914, Zuelzer’s research on insulin was brought to an abrupt halt from which it never recovered.
- Severe blow to hear about the Nobel Prize.
Convincing the world

Nicolae Paulescu: It was actually revealed that during the summer of 1921, at the same time as Banting and Best started their work, that Romanian scientist had already published similar experiments in a European scientific journal, in French.
But Paulescu’s scientific work has since been overshadowed by the ugly revelation of his anti-Semitic politics and the role that he played in inciting the Holocaust in Romania.

Charles Best: When asked whether researchers such as Paulescu, Zuelzer, Kleiner, deserved any credit for the discovery of insulin, his reply spoke volumes:

“None of them convinced the world of what they had … This is the most important thing in any discovery. You’ve got to convince the scientific world. And we did.”
Gift to the World

Canada and US Patents for Insulin

Nobel Prize for Medicine Awarded To Doctors Banting and Macleod

It is not within the power of the properly constructed human mind to be satisfied. Progress would cease if this were the case.

Sir Frederick Grant Banting

“It is not within the power of the properly constructed human mind to be satisfied. Progress would cease if this were the case.”

Sir Frederick Grant Banting

“The Nobel Prize in Physiology or Medicine 1923

"for the discovery of insulin."
James Bertram Collip (1892-1965)

- Born in Belleville Ontario 20 November 1892, education began in a one-room schoolhouse, then Trinity College in Toronto (15). Medical school not possible- too young. Enrolled in Biochemistry and Physiology (Hons), top of class in 1912. PhD under Prof AB Macallum in Toronto. His first scientific paper published when 21 yrs old.

- Research at University of Alberta for almost five years. In 1921, he was Associate Professor of Biochemistry at the University of Alberta with 24 publications. Research in Chicago, Sheffield, and Glasgow.

- In 1921, Collip arrived in Toronto, on a sabbatical, to work with Prof JJR Macleod.

- Rockefeller Fellowship: early December 1921 Collip joined in the effort to purify the pancreatic extract so that it could be administered to humans.

- Early January 1922, Collip wrote enthusiastically to President of U of A detailing success of the insulin experiments – stayed as Assistant Professor in Pathological Chemistry at University of Toronto.

- Collip contributions in human insulin therapy, his extract:
  - Clearance of ketones from diabetic urine
  - Processed glucose to glycogen in the liver.
  - Observed and cured "insulin shock", with glucose injection
  - First to produce a form of animal pancreatic extract pure enough, and not toxic to be injected into a human patient with clinical improvement

https://insulin.library.utoronto.ca/about/collip
James Bertram Collip (1892-1965)

- May 1922: returned to the University of Alberta now as the Chair of the Department of Biochemistry. In Edmonton, researched alternative sources of insulin continuing his research with the help of JJR Macleod and a Carnegie grant. Collip first looked to clams, yeast, vegetables, including potato peelings as a source of insulin- March 1923 presented "glucokinin"
- October 1923, Nobel Prize was announced, JJR Macleod made it known that he would share his prize with Collip. At U of A, 1922 and 1927, Collip published over forty articles, and awarded D.Sc. and M.D
- In 1938: Associate Committee on Medical Research of the National Research Council, chaired by FG Banting. In 1939 Collip VC, then 1941, after Banting's sudden death, Chair
- McGill University in Montreal, then as Dean of the U of A Medical School (from 1948). Research into parathyroid and ACTH isolation.
- Collip and Banting had met the day before Banting’s death. Terrible shock to Collip, for in the years since the discovery of insulin, the two men had formed a friendship.
- Acting Lieutenant-Colonel, Royal Canadian Army Medical Corps from 1942 to 1944 and was promoted to Acting Colonel in 1944. Collip also received many honorary degrees including those from Harvard and Oxford Universities.
- Collip died on 19 June 1965 after suffering a stroke. He and his wife had three children.
When insulin was first used to treat patients in the early 1920s, diabetes specialist Elliott Joslin likened its power to the ‘Vision of Ezekiel’, the Old Testament prophet who is said to have seen a valley of dry bones rise up and be restored to life.

(One patient was) just about the weight of her bones and a human soul

Elliott Joslin, MD

Teddy Ryder

- Born in New Jersey in 1916. Age 4, diagnosed with Type 1 diabetes. Allen diet- starvation diet of about 500-600 cals
- Most such patients only live 6 to 12 months. Teddy later recalled that at five-years-old he was “twenty-six or seven pounds” and could only walk up three or four steps before he needed help. His uncle, Dr Morton Ryder, personally contacted Banting to ask to include Teddy in the trials.
- Banting initially stated that he did not have enough insulin to treat Teddy along with his seven other patients but to bring him in September.
- Dr Ryder wrote to Banting saying that Teddy would survive until then as he was so weak- “did not have the energy to play by himself”.
- Banting agreed to treat Teddy and on July 10th, 1922 he was one of the first people to receive insulin. Within two weeks of starting the treatment, Ryder began to gain weight.
- September 1922: Teddy his sixth birthday party and Banting attended. Teddy returned home in October 1922 and continued his treatment.
DEAR DR. BANTING,

I WISH YOU COULD COME TO SEE ME. I AM A FAT BOY NOW AND I FEEL FINE. I CAN CLIMB A TREE. MARGARET WOULD LIKE TO SEE YOU.

LOTS OF LOVE FROM TEDDY RYDER

Teddy Ryder

• Ryder went on to become a librarian in Hartford, Connecticut.
• He had no serious complications from diabetes the rest of his life.
• In 1990, he attended an unveiling of an exhibit at the University of Toronto honouring the discovery of insulin.
• He revealed his own before and after insulin treatment pictures in the exhibit as he stood in front of the crowd as a healthy man.
• Ryder died of heart failure at the age of 76 in 1993. At the time, he was the longest-treated person using insulin in the world.

Based on a post by Rachel Delle Palme, Banting House NHSC. London, Ontario, Canada
International Trial of the Edmonton Protocol for Islet Transplantation

Background
Islet transplantation offers the potential to improve glycemic control in a subgroup of patients with type 1 diabetes mellitus- the Edmonton protocol.

Methods
36 subjects with type 1 DM underwent islet transplantation at nine international sites. Islets were prepared from pancreases of deceased donors and were transplanted within 2 hours after purification. The primary end point was defined as insulin independence with adequate glycemic control 1 year after the final transplantation.

Results
Of the 36 subjects, 16 (44%) met the primary end point, 10 (28%) had partial function, and 10 (28%) had complete graft loss 1 year after the final transplantation. A total of 21 subjects (58%) attained insulin independence with good glycemic control at any point throughout the trial. Of these subjects, 16 (76%) required insulin again at 2 years; 5 of the 16 subjects who reached the primary end point (31%) remained insulin-independent at 2 years.

Conclusions
Islet transplantation with the use of the Edmonton protocol can successfully restore long-term endogenous insulin production and glycemic stability in subjects with type 1 diabetes mellitus and unstable control, but insulin independence is usually not sustainable.

(ClinicalTrials.gov number, NCT00014911.)

Recruitment of Ahsa1 to Hsp90 is regulated by a conserved peptide that inhibits ATPase stimulation
Hussein SK, Bhat R, Overduin M, LaPointe P. EMBO Reports ? Pending
The history of islet cell transplantation (ITx) and landmark discoveries from 1889 to 2021


Prof James Shapiro and Colleagues
Scientist, researcher and transplant surgeon
Good to meet him someday?
Islet transplant patient #252: ‘A second chance at a better life’

Procedure developed at U of A guides islet cell transplants for people with Type 1 diabetes around the world


Technically, Greene still has diabetes, but she hasn’t had to take insulin since September 2019, after she received a transplant of islet cells, which produce insulin.

Today, she is living a life she could only dream of before the transplant. Every morning when she wakes up, she feels optimistic.
Insulin therapy: An historical overview

- **1922**: Protamine zinc insulin
- **1936**: Isophane (NPH) insulin
- **1946**: Lente insulin
- **2000**: Glargine-100
- **2005**: Degludec 100 and 200
- **2013**: Degludec 100 and 200
- **2015**: Glargine-300

**Types of Insulin**
- Rapid-acting
- Regular/short-acting
- Intermediate-acting
- Long-acting

**Hybrid Closed-Loop Systems**
Roll out 2024-2029

**Professor Partha Kar**
NHS England National Specialty Advisor, Diabetes
**Objectives for Our Diabetes Care**

**Reduce Complications of Type 1 & 2 diabetes**

*A chronic, lifelong condition with considerable morbidity and mortality*

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**Macrovascular complications**

- The risk of stroke in newly treated type 2 diabetes is more than double that of the general population.

- People with diabetes are twice more likely to have cardiovascular disease than someone without diabetes.

- There is almost a 10% increase in the risk of myocardial infarction.

- Hypertension is a significant risk factor for the complications of type 2 diabetes.

- Peripheral vascular disease affects 1 in 3 people with diabetes and increases the risk of heart attack and stroke.

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**Microvascular complications**

- Damage to the kidney filtering systems from diabetes (diabetic nephropathy) is a leading cause of kidney failure.

- Microvascular damage to the retina from diabetes (diabetic retinopathy) is a leading cause of blindness.

- Damage to the nerves from diabetes (diabetic neuropathy) is a leading cause of foot wounds and ulcers which frequently lead to foot and leg amputation.

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**Others:** Obesity, Depression, Anxiety, Dementia, Heart Failure, Increased cancer risks, Increased risk of death from Covid-19, Increased Cancer risk.

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References:
**Diabetic Retinopathy: Evaluating Autoregulation by Determining Flow Under Limits**

**Laser Doppler Velocimeter**

- Retinal Blood Flow Under Different Circumstances

\[ f_D = \frac{v_p}{\Delta s} \]

- \( f_D \) = Doppler Frequency
- \( v_p \) = Velocity Component in Measurement Direction
- \( \Delta s \) = Fringe Spacing

Prof Eva Kohner
Died 2021 age 92
And how to measure the blood vessels....

Rejected multiple times... until Olaf and Oddbjorn stepped in from the Oslo Institute of Theoretical Astro-physics!
In Diabetes retinal blood flow is increased:

- **OBJECTIVES**--(a) To report on retinal blood flow, (b) to formulate a haemodynamic model for the pathogenesis of diabetic retinopathy
- **DESIGN**--Laser-Doppler velocimetry and computerised image analysis
- **SETTING**--Diabetic retinopathy outpatient clinic
- **SUBJECTS**--24 non-diabetic controls and 76 diabetic subjects were studied, 12 had no DR, 27 background DR, 13 pre-proliferative DR, 12 proliferative DR, 12 post laser.
- **MAIN OUTCOME MEASURES**--Retinal blood flow and conductance
- **RESULTS**- Controls 9.52 microliters/min and diabetic patients with no diabetic retinopathy (9.12 ul/min), RBF increased in all grades of DR (background 12.13 ul/min, pre-proliferative 15.27 ul/min, proliferative 13.88 ul/min). Significant decrease in flow after laser (4.48 ul/min). Results independent of age, sex, type of diabetes, duration of diabetes, glycated haemoglobin concentration, blood glucose concentration, blood pressure, and intraocular pressure.
- **CONCLUSIONS**--Retinal blood flow is significantly increased in diabetic retinopathy. This has implications for controlling hypertension and hyperglycaemia as a strategy in reducing morbidity from diabetic retinopathy.

Patel V et al, BMJ 1994
FIG 4—Haemodynamic model for pathogenesis of diabetic retinopathy.

FIG 3—Retinal blood flow in study group. Bars are means. *p<0.03 Compared with background diabetic retinopathy, pre-proliferative diabetic retinopathy, and proliferative diabetic retinopathy. †p<0.001 Compared with all other groups.

Panretinal laser photoocoagulation
Abstract

**Aim:** LDV to define retinal vascular autoregulation to 60% oxygen breathing (vasoconstriction). Normotensive & hypertensive diabetic subjects under conditions of relative normoglycaemia (< 10 mmol) and hyperglycaemia (> 15 mmol) controls

**Results:** RBF significantly higher in diabetic subjects when hypertensive and hyperglycaemic than in the same diabetic subjects when normotensive and normal glucose

- **Normotensive controls** oxygen reactivity was 41.16 ± 14.09%
- **Normotensive 'hyperglycaemic'** diabetic subjects reduced to 21.75 ± 15.56%
- **Hypertensive diabetes, controlled BP, 'normoglycaemia’** 30.49 ± 14.20%
- **Hypertensive diabetes, uncontrolled BP, 'normoglycaemia'** 26.91 ± 13.43%
- **Hypertensive diabetes, controlled BP, 'hyperglycaemia’** 18.36 ± 11.42%
- **Hypertensive diabetes uncontrolled BP, 'hyperglycaemia'** 17.17 ± 13.24%, all p < 0.05

**Conclusion:** Retinal vascular reactivity is impaired in diabetes, both when they are normotensive and when they are hypertensive. Hyperglycaemia, to a degree commonly encountered in clinical practice, impairs retinal vascular auto-regulation even further.

**Effect of ACE-I Perindopril and β-blockade Atenolol on retinal blood flow in hypertensive diabetic subjects**

**Aim:** ACE-I on the diabetic retinal circulation not been studied previously.

Subjects: 45 hypertensive diabetes subjects, RCT, over a period of 12 months. LDV. BP changes similar: perindopril [PE]: 152.1± 3.3/97.2 ± 1.7 to 136.8 ±3.4/85.8 ±2.1; atenolol: 158.9 ±5.1/97.5 ±1.6 to 137.9 ±3.4/85.1 ±1.6; P = .607

- **RBF decreased 17.19 ± 2.21 ul/min, to 14.18 ± 1.50 ul/min in the PE group P = .208**
- **Increased with atenolol 15.80 ± 1.24 ul/min, to 16.99 ± 1.18 ul/min P = .399**
- **Comparison: PE -7.16% ± 11.49%; atenolol, +15.31% ± 9.51% P < .05**
- Increase in RBF in 33.3% PE, 70.6% atenolol
- No significant changes in retinal vascular permeability
- Albuminurina decreased to a greater degree with PE, but did not reach significance (PE, 112.1 ± 39.5 mg/24 h to 88.6 ± 30.5 mg/24 h; atenolol, 87.3 ±51.7 mg/24 h to 82.1 ± 47.7 mg/24 h).

**Conclusion:** ACE inhibition may promote a hemodynamic milieu in the hypertensive diabetic retinal circulation that serves to protect against the progression of diabetic retinopathy, whereas beta-blockade has the opposite effect.
The THOR Effect: Thyroid Hormone Offsets Retinopathy

Sanjarnarayanan Sailesh*, Harpal S Randeva, Chris JO Callaghan, Paul O'Hare, Paul O'Hare, Sam Philip, Ponnusamy Saravanaan and Vined Patel
Warwick Medical School, UK
Submission: July 1, 2017; Published: February 20, 2018
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Abstract

Objective: Thyroid status has been implicated in macular oedema in patients with and without diabetes, however, its effect on macular complications has not been explored. We assessed the prevalence and time to development of diabetic retinopathy in patients with type 2 diabetes with and without thyroxine treatment.

Research design and methods: The prevalence of retinopathy was determined in a retrospective cohort study from a secondary care referral diabetes clinic patients with type 2 diabetes and no-existing treated hypertension (THD; n=147) and duration matched controls without hypertension (NHC; n=385). Using Kaplan-Meier survival analysis and Cox Proportional Hazards regression model we estimated the time to development of retinopathy in the two groups.

Results: Prevalence of retinopathy was 27.9% in THD group, as compared to 55.1% in the NHC group (p<0.001). THD were less than two-third as likely to have concurrent retinopathy than, NHC patients (OR=0.32, 95% CI=0.31 to 0.48, p<0.001). There was a significant difference in the median time to retinopathy between THD and NHC patients (21.0yrs vs. 19.0yrs; Log-Rank p=0.003). Risk of developing retinopathy in THD patients was two-fold that of NHC patients (Hazard ratio=2.413; p=0.003) in a time-dependent variable analysis. The risk of developing retinopathy was significantly lower in patients with longer duration of hypothyroidism and thyroxine treatment prior to diagnosis of diabetes (Hazard ratio=0.557; p=0.004).

Conclusions: A significant sparing effect on development of retinopathy was noted in type 2 diabetic patients with concurrent hypothyroidism (on thyroxine). The exact mechanism(s) for these observations remains to be elucidated.

Keywords: Type 2 diabetes; Hypothyroidism; Diabetic retinopathy; Thyroxine
Model For the Pathogenesis of Diabetic Retinopathy

Capillary Damage + Hypercholesterolaemia

Endothelial Damage

Capillary Non perfusion

Retinal Ischaemia

Vasoactive Factors

Growth Factors

Pericyte loss in Capillaries and Vein

New Vessels

HYPERPERFUSION

HYPERPERfusion

HYPERGLYCAEMIA

Abnormal Autoregulation

ACE-I

May protect

Trials and Tribulations of Ideas for Improving Diabetes Care: My Life in Acronyms

CARDS: Primary prevention of cardiovascular disease with atorvastatin in type 2 diabetes in the Collaborative Atorvastatin Diabetes Study

ASCOT: Long-term mortality after blood pressure-lowering and lipid-lowering treatment in patients with hypertension in the Anglo-Scandinavian Cardiac Outcomes Trial

ADVANCE: Action in Diabetes and Vascular Disease: Preterax and Diamicron Modified Release Controlled Evaluation

RENAAL: Effects of losartan on renal and cardiovascular outcomes in patients with type 2 diabetes and nephropathy

DIRECT: The Diabetic Retinopathy Candesartan Trials

REACH: A twenty-six week, randomized, open-label, 2-arm parallel group real world pragmatic trial to assess the clinical and health outcomes benefit of Toujeo® compared to standard of care insulin for initiating basal insulin in insulin naïve patients with uncontrolled type 2 diabetes mellitus, with 6-month extension

REGAIN: A twenty-six week, randomized, open-label, 2-arm parallel group real world pragmatic trial to assess the clinical and health outcomes benefit of transition to Toujeo® compared to standard of care insulin, in basal insulin treated patients with uncontrolled type 2 diabetes mellitus, with six-month extension

ReFLeCT: A multi-centre, prospective, non-interventional study of insulin degludec investigating the safety and effectiveness in a real world population with type 1 and 2 diabetes mellitus

SUSTAIN 10: Efficacy and safety of semaglutide 1.0 mg once-weekly versus liraglutide 1.2 mg once-daily as add-on to 1-3 oral anti-diabetic drugs (OADs) in subjects with type 2 diabetes
Trials and Tribulations of Ideas for Improving Diabetes Care: My Life in Acronyms

VESALIUS: A Double-blind, Randomized, Placebo-controlled, Multicenter Study to evaluate the Impact of Evolocumab on Major Cardiovascular Events In Patients at High Cardiovascular Risk Without Prior Myocardial Infarction or Stroke

FREMS PDPN: The Utility of Frequency-Modulated Electromagnetic Neural Stimulation (FREMS) as a Third Line Treatment in Patients with Painful Diabetes-Related Peripheral Neuropathy: A Randomised Controlled Trial

Begin: EASY AM - A trial comparing efficacy and safety of NN1250 (SIBA) and insulin glargine in subjects with type 2 diabetes. A 26-week randomised, confirmatory, controlled, open label, multicentre, multinational treat to target trial comparing efficacy and safety of SIBA 200 U/mL three times weekly injected in the morning and insulin glargine once daily in a population of insulin naïve subjects with type 2 diabetes mellitus currently treated with oral anti-diabetic drugs (OADs) qualifying for intensified treatment.

LEADER: Liraglutide Effect and Action in Diabetes: Evaluation of Cardiovascular Outcome Results

LANSCAPE: Comparison of a basal plus one insulin regimen (insulin glargine/insulin glulisine) with a biphasic insulin regimen (insulin aspart/insulin aspart protamine 30/70) in type 2 diabetes patients following basal insulin optimisation.

PRiDE: Micronutrients in Pregnancy as a Risk Factor for gestational Diabetes and Effects on mother and baby
Trials and Tribulations of Ideas for Improving Diabetes Care: My Life in Acronyms

**COMBO:** Use of Duloxetine or Pregabalin in Monotherapy versus Combination Therapy of Both Drugs in Patients with Painful Diabetic Neuropathy “The COMBO - DN (COCombination vs Monotherapy of pregaBalin and dulOxetine in Diabetic Neuropathy) Study”

**MARS**: A Multicenter, Randomized, Double-Blind, Placebo-Controlled, ParallelGroup Trial to Evaluate the Efficacy and Safety of E2007 in Patients with Painful Diabetic Neuropathy

**ELIXA**: A randomized, double-blind, placebo-controlled, parallel-group, multicenter study to evaluate cardiovascular outcomes during treatment with lixisenatide in type 2 diabetic patients after an Acute Coronary Syndrome event

**EXAMINE**: A Multicenter, Randomized, Double-Blind, Placebo-Controlled Study to Evaluate Cardiovascular Outcomes Following Treatment with Alogliptin in Addition to Standard of Care in Subjects with Type 2 Diabetes and Acute Coronary Syndrome

**PIONEER REAL**: A multi-centre, prospective, non-interventional single-arm study investigating clinical parameters associated with the use of once-daily oral semaglutide in a real-world adult population with type 2 diabetes in the United Kingdom

**SURE**: A multi-centre, prospective, non-interventional study investigating the effectiveness of once-weekly subcutaneous semaglutide in a real world adult population with type 2 diabetes

**FOCUS**: A research study to look at how semaglutide compared to placebo affects diabetic eye disease in people with type 2 diabetes
Trials and Tribulations of Ideas for Improving Diabetes Care: My Life in Acronyms

ICCD: TRIAL OF INTERMEDIATE CARE CLINICS FOR DIABETES

ADDRESS-2: An incident and High Risk Type 1 Diabetes Research Cohort –After Diabetes Diagnosis REsearch Support System-2

DARE: Diabetes Alliance for research in England

FOURIER: A Double-blind, Randomized, Placebo-controlled, Multicenter Study Assessing the Impact of Additional LDL-Cholesterol Reduction on Major Cardiovascular Events When AMG 145 is Used in Combination With Statin Therapy In Patients with Clinically Evident Cardiovascular Disease

Omneon-18: A Randomised, Double-Blind, Placebo-Controlled, Multicentre Study to Assess Cardiovascular Outcomes Following Treatment with MK-3102 in Subjects with Type 2 Diabetes Mellitus

DEVOTE: (Degludec CV Outcomes Trial) A trial comparing cardiovascular safety of insulin degludec versus insulin glargine in subjects with type 2 diabetes at high risk of cardiovascular events

CDRC: The Chronic Disease Research into Diabetes study

EASE 2: A Phase III, randomised, double-blind, placebo-controlled, parallel group, efficacy, safety and tolerability trial of once daily, oral doses of Empagliflozin as Adjunctive to insulin thErapy over 52 weeks in patients with Type 1 Diabetes Mellitus (EASE-2)

EASE 3: A Phase III, randomised, double blind, placebo-controlled, parallel group, efficacy, safety and tolerability trial of once daily, oral doses of Empagliflozin as Adjunctive to inSulin thErapy over 26 weeks in patients with Type 1 Diabetes Mellitus (EASE-3)
Alphabet Strategy for Diabetes Care: “Checklist”

A Safety "Checklist", Patient-Centred, Multi-Professional, Evidence-based Approach

National Diabetes Audit
Eight Process Checks
- HbA1c, BP, cholesterol
- Urine albumin, Creatinine
- Foot examination
- BMI and smoking

(Eye screening)

Advice:
- Diet and weight control, Physical activity, not smoking, Good Infection Control Measures, Appropriate PPE, COVID-19 Symptoms, appropriate vaccinations

Blood Pressure:
- aim ≤ 140/80,
- CVD or CKD ≤ 130/80

Cholesterol & CKD Prevention
- Most Atorvastatin 20mg or 80mg, TC ≈ 4 mmol/l
- UACR yearly and treat

Diabetes Control:
- HbA1c < 59 (7.5%) usual target, ideal < 48 (6.5%)
- Outcome based Rx: usually SGLT2-i, ? GLP-RA
- Safer insulins where needed

Eyes:
- check yearly at least

Feet:
- daily self-care, HCP check yearly at least

Guardian Drugs:
- ?Aspirin 75mg (CVD atheroma), ?ACE-i, ARBs (esp CKD, HF, CVD), appropriate SGLT2-i (NICE NG-28), GLP-RA

Healthcare Professional Advice: (with kindness and compassion)
- Contraception & Pre-conception Advice
- Driving and Occupation Advice
- Hospital Admission Care
- Other individualised advice eg Ramadan, Travel
The main components of diabetes care can usefully be remembered, both by healthcare professionals and those with diabetes, by using the “Alphabet Strategy”:

• Advice—Education, self management, concordance with treatment. Special focus on smoking cessation, diet, physical activity, and weight reduction.

• Blood pressure targets—Blood pressure < 130/80 mm Hg, which may require combinations of a diuretic, ACE inhibitor/ARB, and a CCB (audit standard < 140/90 mm Hg).

• Cholesterol and LDL cholesterol targets—Total cholesterol < 4.0 mmol/l and LDL cholesterol < 2.0 mmol/l or a 25% reduction in total cholesterol and a 30% reduction in LDL cholesterol, which ever gets the person to the lowest absolute level. A non-HDL cholesterol < 3.0 mmol/l and triglycerides < 1.7 mmol/l are preferred values but are not targets. Nor is there a target for HDL cholesterol, but values below 1.0 mmol/l in men (1.2 mmol/l in women) are associated with an increased risk of CVD.

• Diabetes control—A normal HbA1c% is ideal but the practical target is ≤ 6.5%. Metformin is the first choice for most people with type 2 diabetes, especially if overweight. Early recourse to multiple therapies and insulin will be needed if targets are not reached. While the evidence is limited, attention to glycaemic control in the context of acute coronary syndromes is advised, and the DIGAMI protocol may be an appropriate strategy.

• Eye care—Yearly digital photography is recommended with appropriate ophthalmological referral if retinopathy is present, and management of all other CVD risk factors.

• Feet care—Yearly examination with appropriate referral as required, and management of all other CVD risk factors.

• “Guardian” drugs for cardiovascular prevention—Aspirin 75 mg daily is indicated for people with diabetes who meet any of the following criteria:
  • established atherosclerotic disease
  • ≥ 50 years, or who are younger but have had the disease for more than 10 years, or who are already receiving treatment for hypertension.

A statin is appropriate in most people with diabetes in order to achieve the total and LDL cholesterol targets. ACE inhibitor/ARB therapy is indicated when there is microalbuminuria or proteinuria or diabetic nephropathy.
Diabetes Patients are at higher risk of CVD and Death, investigation into risk factor control and effect on these outcomes

Cohort Study: 271,174 T2DM Pts followed for 5.7 years median. Swedish database. 1,355,870 controls matched for age, sex, country

5 Risk factors:
- A: Current Smoker
- B: BP ≥ 140/80
- C: LDL ≥ 2.5 mmol/l
- CKD: Albuminuria (Micro or Macro)
- D: HbA1c > 53 mmol/mol (7%)

Age groups: < 55, ≥55-65, ≥65-80, ≥80

Models adjusted for Socio-economic status (income, marital status, immigrant status, educational level). Deaths adjusted for CHD, HF. MI adjusted for AF and HF. Heart failure adjusted for AF and CHD. Stroke adjusted for AF, HF and CHD.

Similar Trends for:
- Excess MI
- Excess Stroke
- Excess Heart Failure
Prevention of Diabetes

- Overweight and Obesity prevention, Optimising Physical Activity
- Balanced diet (less carbohydrate-rich diet)

What is the % increase in risk of Diabetes with a BMI of <23 versus ≥ 35

Men: ...
Women: ...
What is the % increase in risk of Diabetes BMI of <23 versus ≥ 35?

A: Men 42%, Women 93%
B: Men 100%, Women 120%
C: Men 420%, Women 600%
D: Men 4100%, Women 9200%
E: Men 200%, Women 300%
What is the % increase in risk of Diabetes: BMI of <23 versus ≥ 35

Actually!

Men: 4100 %
Women: 9200%
Medical Complications Resulting from Severe Obesity


Medical Complications Resulting from Severe Obesity.

https://doi.org/10.1007/978-3-319-42536-8_5
Mifflin-St Jeor Equation

- 40yr male
- 170cm tall
- 80kg weight
- sedentary lifestyle requires 2000kcal/day to maintain their bodyweight

The PLATE Idea
Protein Limits Action Towards Eating
Deepa Lad and Sheena Bageerutty

- **Protein requirement** = 80g
- This is $80 \times 4 = \text{"Protein Calories"} = 320$ calories
- Person X should be on a $320 \text{ kcal} = 16\%$ of calories from protein in the diet 2000 kcal

- Patient eats **2000 kcals of Curry and rice or Pizza and chips**: only $12\%$ of calories come from protein.
- This is $12\% \times 2000 = 240$ calories from Protein = **60g of Protein**

- **Protein Deficit is 20g** (80g – 60g)
- To have Satiety, extra **20g of protein are needed**

- Person X eats 2000 cals of Curry and less rice or Pizza with Salad:
  - **16\%** of calories come from protein.
- This is $16\% \times 2000 = 320$ calories from Protein = **80g of Protein**
- Protein needs satisfied
- **No Protein Deficit**

Too Much Carb and not enough Protein

A Barrier to Preventing Diabetes and Good Diabetes Control in South Asian and some other communities?

Primary care-led weight management for remission of type 2 diabetes (DiRECT)
M Lean et al Lancet 2018;391:541–551,

- **Population:** 20–65 years, Type 2 DM diagnosed ≤ 6 yrs, BMI 27–45 kg/m², and not on insulin
- **Results:** Diabetes remission in 68 (46%) intervention group, 6 (4%) controls
- **Remission rate:**
  - 0% in 76 participants who gained weight
  - 7% (6) of 89 participants who maintained 0–5 kg weight loss
  - 34%(19) of 56 participants with 5–10 kg loss
  - 57% (16) of 28 participants with 10–15 kg loss
  - 86% (31) of 36 participants who lost 15 kg or more
- **Conclusion:** At 12 months, almost half of participants achieved remission and off antidiabetic drugs. Remission of type 2 diabetes is a practical target for primary care
Diabetes Care Plan
A Safety “Checklist”, Patient-Centred, Multi-Professional, Evidence-based Approach

Our patient spend 3 hours a year with HCP in Diabetes Care- the other 8763 hours looking after themselves!

- **Patient Information**: Background and Personal Targets based on National Diabetes Audit

- **Diabetes UK 15 Healthcare Essentials**: Brief summary of main points

- **Reducing Complication**: Statement for information and endorsing collaborative care

- **Key Contacts**: Table of key contacts and roles, patient to fill in details
**Diabetes Care Plan**

A Safety “Checklist”, Patient-Centred, Multi-Professional, Evidence-based Approach

- **Alphabet Strategy Information:**
  Notes of each aspect of care

- **Personal Targets:**
  as agreed by patient with HCP advice

- **Result 1:** Result at current review, or previous result to compare to Result 2

- **Result 2:** Result at current review, to compare to Result 1

- **National Targets:**
  Usual National Targets to guide collaborative agreed personalised targets for the patient

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### Advice on Lifestyle:

<table>
<thead>
<tr>
<th>Advice on Lifestyle</th>
<th>Your target</th>
<th>Result 1</th>
<th>Result 2</th>
<th>National Targets</th>
</tr>
</thead>
<tbody>
<tr>
<td>Weight and Body Mass Index</td>
<td></td>
<td></td>
<td>≤25</td>
<td>Non smoker</td>
</tr>
<tr>
<td>Stop smoking: if you smoke</td>
<td></td>
<td></td>
<td></td>
<td>Within 12 mths diagnosis</td>
</tr>
<tr>
<td>Diet and Physical activity</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### Blood Pressure:

<table>
<thead>
<tr>
<th>Blood Pressure</th>
<th>Your target</th>
<th>Result 1</th>
<th>Result 2</th>
<th>National Targets</th>
</tr>
</thead>
<tbody>
<tr>
<td>Yearly check: High BP can cause heart disease, stroke, eye and kidney disease</td>
<td></td>
<td></td>
<td>140/90 or less</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Kidney tests yearly</td>
<td></td>
</tr>
</tbody>
</table>

### Cholesterol and CKD Prevention

<table>
<thead>
<tr>
<th>Cholesterol and CKD Prevention</th>
<th>Your target</th>
<th>Result 1</th>
<th>Result 2</th>
<th>National Targets</th>
</tr>
</thead>
<tbody>
<tr>
<td>High cholesterol can cause heart disease, stroke and poor circulation the legs with risk of amputation</td>
<td></td>
<td></td>
<td>Less than 5 mmol/L</td>
<td></td>
</tr>
<tr>
<td>CKD: Chronic Kidney Disease Prevention - Yearly kidney tests (Creatinine and UACR)</td>
<td></td>
<td></td>
<td>Kidney tests yearly</td>
<td></td>
</tr>
</tbody>
</table>

### Diabetes Control:

<table>
<thead>
<tr>
<th>Diabetes Control</th>
<th>Your target</th>
<th>Result 1</th>
<th>Result 2</th>
<th>National Targets</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hba1c test: measures the amount of glucose sticking to your blood in the last 2 months</td>
<td></td>
<td></td>
<td>Hba1c 6% or less (7.6%)</td>
<td></td>
</tr>
<tr>
<td>Hypo avoidance: essential to avoid low glucose levels of less than 4</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Driving: Remember to check before driving: glucose 5 or more to drive</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### Eyes:

<table>
<thead>
<tr>
<th>Eyes</th>
<th>Your target</th>
<th>Result 1</th>
<th>Result 2</th>
<th>National Targets</th>
</tr>
</thead>
<tbody>
<tr>
<td>It is important that your eyes are examined yearly. Treatment may be needed to stop blindness</td>
<td></td>
<td></td>
<td>Annual check</td>
<td></td>
</tr>
</tbody>
</table>

### Footcare:

<table>
<thead>
<tr>
<th>Footcare</th>
<th>Your target</th>
<th>Result 1</th>
<th>Result 2</th>
<th>National Targets</th>
</tr>
</thead>
<tbody>
<tr>
<td>Examine your feet daily: check for heat (Infection), ulcers, numbness, circulation. Yearly HCP examination</td>
<td></td>
<td></td>
<td>Daily and annual check</td>
<td></td>
</tr>
</tbody>
</table>

### Guardian Drugs / Flu jab:

<table>
<thead>
<tr>
<th>Guardian Drugs / Flu jab</th>
<th>Your target</th>
<th>Result 1</th>
<th>Result 2</th>
<th>National Targets</th>
</tr>
</thead>
<tbody>
<tr>
<td>Take your medications as advised. Many are essential to avoid heart and kidney disease.</td>
<td></td>
<td></td>
<td>? taken regularly</td>
<td></td>
</tr>
</tbody>
</table>
Birmingham and Solihull CCG
My Diabetes Self Management Plan

Works through GP Systems- eg EMIS, and printable to give or post to patients
# NDA Data 2021-2023: NHS England - Midland ICB Areas

## Type 2 Diabetes Mellitus

<table>
<thead>
<tr>
<th>ICS</th>
<th>All Eight Care Processes - T2</th>
<th>Three Treatment Targets</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>2021/22 (Q1)</td>
<td>2022/23 (Q2)</td>
</tr>
<tr>
<td>------------------------------------------</td>
<td>---------------</td>
<td>---------------</td>
</tr>
<tr>
<td>Birmingham and Solihull</td>
<td>51.6%</td>
<td>21.9%</td>
</tr>
<tr>
<td>Coventry and Warwickshire</td>
<td>32.5%</td>
<td>11.5%</td>
</tr>
<tr>
<td>Derby and Derbyshire</td>
<td>48.7%</td>
<td>20.9%</td>
</tr>
<tr>
<td>Herefordshire and Worcestershire</td>
<td>47.9%</td>
<td>21.7%</td>
</tr>
<tr>
<td>Leicester, Leicestershire and Rutland</td>
<td>46.7%</td>
<td>18.5%</td>
</tr>
<tr>
<td>Lincolnshire</td>
<td>47.5%</td>
<td>20.2%</td>
</tr>
<tr>
<td>Northamptonshire</td>
<td>38.8%</td>
<td>16.7%</td>
</tr>
<tr>
<td>Nottingham and Nottinghamshire</td>
<td>47.0%</td>
<td>19.5%</td>
</tr>
<tr>
<td>Shropshire, Telford and Wrekin</td>
<td>26.1%</td>
<td>12.3%</td>
</tr>
<tr>
<td>Staffordshire and Stoke on Trent</td>
<td>38.5%</td>
<td>16.6%</td>
</tr>
<tr>
<td>The Black Country and West Birmingham</td>
<td>44.2%</td>
<td>17.8%</td>
</tr>
<tr>
<td><strong>England</strong></td>
<td><strong>47.9%</strong></td>
<td><strong>19.5%</strong></td>
</tr>
</tbody>
</table>

## Type 1 Diabetes Mellitus

<table>
<thead>
<tr>
<th>ICS</th>
<th>All Eight Care Processes - T1</th>
<th>Three Treatment Targets</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>2021/22 (Q1)</td>
<td>2022/23 (Q2)</td>
</tr>
<tr>
<td>------------------------------------------</td>
<td>---------------</td>
<td>---------------</td>
</tr>
<tr>
<td>Birmingham and Solihull</td>
<td>36.1%</td>
<td>34.6%</td>
</tr>
<tr>
<td>Coventry and Warwickshire</td>
<td>27.3%</td>
<td>27.8%</td>
</tr>
<tr>
<td>Derby and Derbyshire</td>
<td>36.9%</td>
<td>35.6%</td>
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<td>38.5%</td>
<td>16.6%</td>
</tr>
<tr>
<td><strong>England</strong></td>
<td><strong>35.2%</strong></td>
<td><strong>13.9%</strong></td>
</tr>
<tr>
<td>No.</td>
<td>Clinical Case</td>
<td>Journal/Book Reference</td>
</tr>
<tr>
<td>-----</td>
<td>-------------------------------------------------------------------------------</td>
<td>-------------------------------------------------------------</td>
</tr>
<tr>
<td>1</td>
<td>Osteomyelitis, discitis, epidural and psoas abscess secondary to Salmonella enterica</td>
<td>BMJ Cases 2015</td>
</tr>
<tr>
<td>2</td>
<td>Systemic corticosteroids for the outpatient treatment of necrobiosis lipoidica in a diabetic patient</td>
<td>Journal of Dermatological Treatment 2007</td>
</tr>
<tr>
<td>3</td>
<td>Fatal emphysematous pyelonephritis with gas in the spinal extradural space in a patient with diabetes</td>
<td>Diabetic Medicine 2001</td>
</tr>
<tr>
<td>4</td>
<td>Herbal Remedy for Diabetes: Two Case Reports</td>
<td>Experimental and Clinical Endocrinology &amp; Diabetes 2009</td>
</tr>
<tr>
<td>5</td>
<td>Isolated Thyroxine Malabsorption Treated With Intramuscular Thyroxine Injections</td>
<td>American Journal of the Medical Sciences 2009</td>
</tr>
<tr>
<td>6</td>
<td>Granuloma annulare and perinephric abscess in undiagnosed diabetes mellitus</td>
<td>Br J Diabetes Vasc Dis 2003</td>
</tr>
<tr>
<td>7</td>
<td>An unusual cause of a foot ulcer in a patient with type 1 diabetes</td>
<td>Br J Diabetes Vasc Dis 2004</td>
</tr>
<tr>
<td>8</td>
<td>Allergic reaction to blue cheese: serendipity or actual causation?</td>
<td>The New Zealand Medical Journal 2008</td>
</tr>
<tr>
<td>9</td>
<td>Eruptive Xanthomata in uncontrolled diabetes</td>
<td>Br J Diabetes Vasc Dis 2002;2:60-1</td>
</tr>
<tr>
<td>10</td>
<td>A successful spontaneous pregnancy in abetalipoproteinemia: Amsterdam or the art of vitamin replacement?</td>
<td>BMJ Case Reports 2014</td>
</tr>
<tr>
<td>11</td>
<td>A Lump in the Chest?</td>
<td>BMJ 1995</td>
</tr>
<tr>
<td>13</td>
<td>Pneumococcal septic arthritis</td>
<td>Rheumatol Pract 1986</td>
</tr>
<tr>
<td>16</td>
<td>Young Doctor: “Type 1 “ diabetes for 10 years- 10 000 insulin injections, 5000 fingerpick tests to a tablet a day and better control- HNF1α Diabetes-</td>
<td></td>
</tr>
</tbody>
</table>

**Tree Frog Fingers Sign**
(PS Same School as David Attenborough)
## Some Case Reports with Dr Rajiv Nair

**Farrar H, Abbey A, Patel V, Nair R.**

**Osteomyelitis, discitis, epidural and psoas abscess secondary to Salmonella enterica in a man with diabetes mellitus and newly diagnosed α-thalassaemia trait. BMJ Case Rep. 2015 Jan 21;2015:bcr2014207008.**

**Othonos N, Patel V, Nair R, Ayre S, Saravanan P.**

**Diabetes: The forgotten complications of parathyroidectomy**

*Endocrine Abstracts* (2014) **34** P148 | DOI:

**Sukumar N, Nair R, Patel V.**


### Abstract 1

We report the case of a 65-year-old man with type 2 diabetes mellitus and α-thalassaemia trait. Investigations for relapsing and remitting fever found vertebral osteomyelitis, discitis and epidural and psoas abscess secondary to Salmonella enterica.

### Abstract 2

Monogenic forms of b-cell diabetes have been broadly divided according to age of presentation, into neonatal and adolescent/adult forms (the latter previously termed maturity onset diabetes of the young – MODY). Herein we describe the identification of monogenic diabetes in a lady with a long-term history of treatment for type 1 diabetes diagnosed in early adulthood.
“The ability of systems to provide care to patients with diverse values, beliefs, and behaviours including tailoring delivery to meet patients’ social, cultural and linguistic needs”

Betancourt & Carrillo (2002)

Health Inequalities:

Avoidable inequalities that are unfair or unjust

Braveman & Gruskin (2003) Defining Equity in Health
COVID-19 Guidelines
Diabetes care in the Sikh patient: cultural and clinical aspects

Nirupam Goenka¹, Kirpal Marwa¹, Harpal Randeva¹, John Morrissey¹, Vinod Patel¹

¹Department of Clinical and Experimental Pharmacology, University College London, London, UK

The 5th religion

The word ‘Sikh’ in the Punjabi language means ‘disciple’ and the Sikh religion today has a following of over 20 million people worldwide. Sikhs are the disciples of God who follow the writings and teachings of the Ten Sikh Gurus. The Sikh religion originated in the Punjab region of India. The founder of the Sikh religion was Guru Nanak who was born in 1469. He preached a message of love and understanding and coined some specific practices and rituals at certain Hindu and Muslim sects. Guru Nanak passed on the leadership of this new religion to nine successive Gurus. The final living Guru, Guru Gobind Singh, died in 1708.

Sikhism has been revolutionary in many ways, especially in its view of women. At the time of the Guru, women were not considered the equals of men in society. Men were allowed polygamy, but widows were not allowed to remarry and were encouraged to burn themselves on their husbands’ funeral pyre. Child marriage and female infanticide were prevalent and often given religious sanction.

In this context, the Gurus preached that women were equal to men, worthy of praise and striving of education, and the dual restrictions of caste and female infanticide were condemned. Sikhs also taught that women, despite being widowed or unmarried, were encouraged to remarry. The Sikh religion was also innovative in its condemnation of a ‘purity’ class and

The Golden Temple: The Harimandir Sahib (Encrusted Temple of God) is also commonly known as the Golden Temple or Darbar Sahib (Divine Court). It is situated in the city of Amritsar in Punjab. The golden temple is a living symbol of the spiritual and historical traditions of the Sikhs.

In line with the belief that people of different religions were equally capable of reaching salvation while following their own religions, during his life, the last living Sikh Guru, Guru Gobind Singh (1666-1708), established the Khalsa order instructing the pure soldiers. The Khalsa upheld the highest Sikh values of commitment and dedication to their faith. The Khalsa are men and women who strictly follow the Sikh code of conduct and wear the prescribed physical articles of the faith (Table 1).

The spiritual path is not a living person as such, but a religious structure called the Sri Guru Granth Sahib, the Eternal Guru of the Sikhs. It contains the poetry of the Gurus as well as the writings of saints of other faiths whose words it was considered to be the voice of the Sikh Gurus. In the region, Sikhs can be regarded as a multi-faith ethnic religion to a great extent than the other main faiths.
Diabetes care and Ramadan: to fast or not to fast?

SASKASA SHAIKH, DIANE JAMES, JOHN MORRISSEY, SIVA PATEL

In the month of Ramadan, the Quran was revealed. Thus the believers received your good news. In that month, fast. But those who are ill or on a journey shall fast a similar number of days later. God desires your well-being and not your discomfort.

The Quran

Introduction

The goal of this study is to assess the prevalence of diabetes and prediabetes among Muslim patients with diabetes in a clinic setting. The data were collected from 201 patients who were diagnosed with diabetes or prediabetes in the Lahey Clinic Diabetes Study. The data were analyzed using SPSS software. The study was approved by the institutional review board.

Methods

The study was conducted in a clinic setting. Participants were recruited through the clinic's electronic health record system. The dataset included demographic information, medical history, and laboratory results. The data were analyzed using descriptive statistics and logistic regression analysis.

Results

The prevalence of diabetes among the study participants was 52.3%. The prevalence of prediabetes was 16.2%. The prevalence of diabetes was higher in females than in males (62.1% vs. 42.6%). The prevalence of prediabetes was higher in females than in males (20.6% vs. 11.6%). The results of the logistic regression analysis showed that age, gender, and family history of diabetes were significant predictors of diabetes and prediabetes.

Conclusion

The prevalence of diabetes among the study participants was higher in females than in males. The prevalence of prediabetes was also higher in females than in males. Age, gender, and family history of diabetes were significant predictors of diabetes and prediabetes.

References


Ramadan
Patient Education

Treatment Changes during Ramadan

- Are you taking any medicines that might need adjusting, for example, some drugs need changing as you cannot eat food or drink.
- We would advise you to change your treatment as shown in the table below.
- Please go back to your normal times and doses after Ramadan.

<table>
<thead>
<tr>
<th>Current Treatment</th>
<th>Ramadan Changes</th>
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<tbody>
<tr>
<td>Morning</td>
<td>Fasting starts</td>
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<tr>
<td>Evening</td>
<td>Fasting ends</td>
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</table>

General Advice

- The Diabetes Care Team would like to help you fast safely during Ramadan. You should be up to date with all aspects of diabetes care.
- Over eating during Ramadan and Eid have an immediate effect on your blood sugar and may make you gain weight.
- Fasting allows you to abstain from smoking. Ramadan is a good time to stop smoking.
- Eat 6 portions of fruit and vegetables a day.
- Implementing a new routine in your daily life is a good time to make small lifestyle changes. These changes will help you to have good control over your diabetes and reduce the risk of heart attack or stroke.

Diet

- When you break your fast, try to have non-processed foods such as vegetables, pasta and pasta.
- Eat more fruits, vegetables, dairy and legumes.
- All drinks should be sugar-free, avoid adding sugar to tea and coffee. Limit the amount of salt you add to food.
- To avoid dehydration, make sure you drink plenty of water before starting the fast.
- When you break your fast, try to have non-processed foods such as vegetables, pasta and pasta.

Medication

- During Ramadan, it is very important to keep taking your regular tablets. Some tablets will need adjusting.
- Your tablets will keep your blood glucose in control and keep you feeling well.
- If you decide to fast and you are on insulin, you will need to be very careful, your insulin dose will need to be changed. Do not stop your insulin.
- For further advice, contact the Diabetes Team at the hospital or your own GP.

Diabetes Control

- Check your blood glucose regularly. It should be between 4 - 7.
- When your blood glucose drops below 4, you may be at risk of having a hypoglycaemic attack. Try to eat snacks, drinking, breasting, keeping your blood glucose at a steady level. If this happens, you must take 2 or 3 glucose tablets followed by a snack.
People with diabetes observing Ramadan fasts are at a higher risk of complications (hypoglycaemia, hyperglycaemia, ketoacidosis) due to changes in eating patterns and circadian rhythms.

Current guidelines highlight the role of pre-Ramadan risk stratification and counselling by HCPs with emphasis on the need for advice on adequate dietary and fluid intake, BG monitoring and awareness of when to break the fast.

Based on robust evidence, guidelines exist to provide clinically-relevant recommendations on lifestyle modifications and glucose-lowering therapies.

An individualised patient-centric treatment plan is essential to not only achieve optimal glycaemic outcomes but also enable people with diabetes to observe a risk-free month of fasting during Ramadan.

You Tube: Managing Type 2 Diabetes During Ramadan London Mosque Imam Doctor Patel
https://youtu.be/dGyUzlkU_ZI
ACRONYM:
Archive of Clinical Research Outputs to Navigate Your Clinical Management

A Resource for Teaching Evidence-based Diabetes Clinical Care

Clinical Faculty
Friends of Vinod Patel
Warwick Medical School, George Eliot Hospital NHS Trust, Nuneaton

Student Faculty
Hannah Abebe  Mara Bortnowschi  Rebecca Campbell
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<tbody>
<tr>
<td>1: Infant</td>
<td><strong>Adam Eaton:</strong> 5 year old. No significant past medical history apart from prematurity and neonatal jaundice. His mother had gestational diabetes. Adam is in the 90 percentile for weight at his infant school. Loves playing computer games.</td>
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<tr>
<td>2: Child</td>
<td><strong>Bedi Bishan:</strong> 15 years old now having developed Type 1 diabetes at the age of 11. He has taken well to using the Flash Monitoring device for glucose measurements. He craves carbohydrates and really does not like PE.</td>
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<tr>
<td>3: Pregnant</td>
<td><strong>Camilla Begum:</strong> is 29 years old and pregnant with her second child. She had difficulty conceiving and had a diagnosis of PCOS. She has Gestational diabetes. She is happy to stick to her diet and take metformin but is very reluctant to take insulin. Her husband has type 2 diabetes and wants advice on observing Ramadan.</td>
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<tr>
<td>4: Self-employed</td>
<td><strong>Daniella Deronton:</strong> is 48 years old and work as a part-time taxi driver and as an odd-jobs business. This can include fitting windows and guttering on houses. She is overweight and desperate to lose weight with a pending wedding and daughter’s graduation. She had been told that she has pre-diabetes</td>
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<td>5: Teaching Assistant</td>
<td><strong>Eliot Evans:</strong> is a 58 year old assistant Science Teacher and in charge of the Chemistry and Physics Labs at the local academy. He recently had a heart attack and has a foot ulcer that has proven very slow to improve. Does not want Covid-19 vaccine. He had type 2 diabetes and is very reluctant to have statins and indeed any further drug therapy.</td>
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<tr>
<td>6: Retired Nurse</td>
<td><strong>Felix Kanhai</strong> is 67 years old and recently retired and looking forward to spending time with his allotment and want to continue to singing activities. He is looking to visiting family in the Caribbean. He hope to travel with his family on a cruise.</td>
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<tr>
<td>7: Residential Care</td>
<td><strong>Georgina Sklodowska:</strong> an 83 year old woman, now living alone. She was recently admitted overnight to hospital having had a fall. She is an amateur artist and now has difficulty holding paintbrushes.</td>
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DMITRI Project
Diabetes Management Informed by Trials Research Integration

The Central Idea
• To create an educational resource that will be useful for Clinicians and Patients across a broad spectrum of clinical scenarios in Diabetes Care
• This will encompass advice on general health, therapies specific to diabetes and special circumstances in relation to their life-journey or culture

DMITRI Project
Diabetes Management Informed by Trials Research Integration

Knowledge Blocks

DMITRI Project
Diabetes Management Informed by Trials Research Integration

Table - Education Blocks Relevant to the Case

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<td>Patients - Clinical Algorithms</td>
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<td>Prevention of Type 2 DM in Children</td>
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<td>Diet in Diabetes Care</td>
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<td>Blood Pressure Treatment</td>
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<td>Cholesterol Lowering Treatment</td>
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<td>Glycemic Control</td>
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<td>Diabetes Foot Complications</td>
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<td>Eye Complications</td>
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<td>SGLT 1 Inhibitors</td>
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<td>Safe Driving</td>
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DMITRI Project
Diabetes Management Informed by Trials Research Integration

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<td>APOT Study</td>
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<td>ESGT Study</td>
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<td>Clinical Trials</td>
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<td>Genetic DM &amp; PCOS</td>
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<td>Types of Diabetes &amp; Diagnosis</td>
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<td>CARDS - Cardiovascular Trial</td>
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**Gestational Diabetes (GDM)**

- GDM is defined as hyperglycaemia that begins or is first diagnosed in pregnancy. It is associated with increased pregnancy complications and long-term metabolic risks for the woman and the offspring.

- However, the current diagnostic and management strategies recommended by national and international guidelines are mainly focused on short-term risks during pregnancy and delivery.

- Good evidence for long-term risk in women with gestational diabetes and their offspring.

- A shift is needed in the thinking about GDM; moving from the perception of a short-term condition that confers increased risks of large babies to a potentially modifiable long-term condition that contributes to the growing burden of childhood obesity and cardiometabolic disorders in women and the future generation.

Preventing Death, CVD and Micro-vascular Complications in Type 1 Patients:
The Triple Shield of BP control, lipid-lowering and Glycaemic control

- *Huo et al 2016*: Type 1 diabetes 12.2 years of life lost on average
- *Hero et al 2016*: 24230 Type 1 patients, Cohort Study, 5387 (22%) on lipid-lowering (97% statins), rest 18643 not, 6 year follow up, Sweden
- Statin Treatment associated with:
  - 40% CVD reduction
  - 44% Stroke reduction
  - 22% MI reduction
  - 44% Death reduction
- Number needed to save one death was 297 treatment years or 50 patients treated for 6 years.

One key message- always- is to consider Statins for all Type 1 patients according to NICE Guidelines
All over 40 years of age or if > 10 years diabetes duration
Effective Contraception Essential in females

Hypertension and Cholesterol Goals
Driven mainly by strong relationships (RR range 1.8-12.1) with mortality, CAD, and overt nephropathy, suggested goal levels are as follows:

- LDL chol. <2.6 mmol/l, HDL chol. >1.1 mmol/l, trigs. <1.7mmol/l
- Systolic BP <120 mmHg, Diastolic BP <80 mmHg
- Age, sex, glycaemic control had little influence on these independent goals.

HbA1c: 9% vs 7%
75 vs 53 mmol/mol
T2D Onset in Younger People is a Growing Problem

Notes: There is no standard definition for younger adults, however the National Diabetes Audit (NDA) typically includes people aged <40 years. Two different datasets covering different geographical regions are shown in the graph and cannot be compared directly but show a trend in onset of diabetes in younger people.

CPRD=Clinical Practice Research Datalink; NDA=National Diabetes Audit; T2D=Type 2 Diabetes.


T2D is now more prevalent than T1D in younger people in England. 

UK CPRD data

People aged ≤40 years with T2D

Number of people

642 2752 7519 15326 52498 56423 106142

England NDA

People aged <40 years with T2D

Number of people

86118 113672 121340 130218 132097 138443 138443

Younger people (<40 years) in England in 2021-2022:

T1D 117,224
T2D 138,443
Preventing Death, CVD and Micro-vascular Complications in Type 2 Patients:
The Triple Shield of BP control, lipid-lowering and Glycaemic control

Primary Prevention: Atorvastatin 10mg

Blood Pressure
UKPDS 38: 154/87 versus 144/82

-21 Non-significant
-34 Significant
-35 Significant
-37 Significant
-44 Significant
-56 Significant
-24 Significant
Beneficial legacy effect of good glycaemic control in Type 1 and Type 2 Diabetes

DCCT/EDIC Long term follow up and metabolic memory in Type 1 diabetes and Type 2 UKPDS: long term follow up and legacy effect.
Program uses novel approach to improve diabetes care in First Nations communities

It never occurred to Peter Young that he might get diabetes—he had lost a childhood friend to an uncontrolled diabetic foot infection. “I didn’t know how diabetes works,” said the 44-year old member of the Bigstone Cree Nation in Wabasca, 322 kilometres north of Edmonton.

So when the telltale signs of Type 2 diabetes began to plague him last summer—lightheadedness, an unquenchable thirst, urinating every hour—“I didn’t have a clue.” “When the doctor gave me the news, I got in my truck and I just cried,” Young said. “It was such a shock. I thought, ‘My life is over, I can’t have any fun stuff anymore.'”

An innovative new program co-developed with the First Nations and and researchers at the University of Alberta, is revolutionizing care and improving outcomes for First Nations members across the province. Young, has now wrestled his blood sugars back into the normal range with a daily regimen of medication, exercise, meal planning and finger-prick blood tests when needed...

“I’m not eating as many fatty foods, I’m eating lots more fruit and drinking lots more water. If I have something sweet, I'll walk it off.”

U of A epidemiologist Dean Eurich says the RADAR program has helped more than 700 people with Type 2 diabetes improve their health with culturally appropriate support that is adaptable to each community’s specific needs... improved by an average of 10% in key metrics such as blood sugar, BP and cholesterol levels.
From the Review
This is an important book. In this time, when our Cree communities and other Indigenous groups are facing down a brutal and pervasive diabetes epidemic, Sweet Bloods offers a Talking Circle in print: frank, funny, and emotional stories of James Bay Cree people living with the disease. Once you start this book, you'll want to read to the end. -- Bella M. Petawabano

The stories contained in The Sweet Bloods of Eeyou Istchee are incredible. They are life lessons, they are tales of warning, they are songs of resilience, they are prayers for a healthier life-- Joseph Boyden

Ruth
While I was working on Sweet Bloods, many storytellers informed me that their diabetes began in the Indian Residential Schools (when they were receiving fewer than 600 cals/day) ...
Helping Everyone Achieve Longer Term Health? An evidence-based U of A Faculty Approach

Our Area of Care and Influence?

- **Autonomy**: the patient has the right to refuse or choose their treatment (*Voluntas aegroti suprema lex.*)
- **Beneficence**: a practitioner should act in the best interest of the patient (*Salus aegroti suprema lex.*)
- **Non-maleficence**: do no harm (*Primum non nocere*)
- **Justice**: distribution of scarce health resources, based on fairness and equality. Addressing Health Inequalities. Addressing Socio-economic Deprivation (*iustitia*)

Dr Rashmi Shukla


<table>
<thead>
<tr>
<th>Philosophy Politics, Economics</th>
<th>10 Fold Path Idea</th>
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<tbody>
<tr>
<td><strong>Overall</strong> Philosophy</td>
<td>1. <strong>Good Mental Health</strong>: Connect with people and foster good relationships, Be active, Learn new skills, Give to others, Pay attention to the present moment (mindfulness), time in Nature</td>
</tr>
<tr>
<td><strong>Personal Lifestyle Advice</strong></td>
<td>2. <strong>Never Smoking</strong>: Not smoking or cessation. Advise vaping if last resort for nicotine replacement.</td>
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<td></td>
<td>3. <strong>Higher Diet Quality Score</strong>: Alternative Healthy Eating Index Diet of 60 points or more</td>
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<td></td>
<td>4. <strong>Physical Activity: Moderate to Vigorous</strong>: Moderate or more physical activity, 3 Mets or more, 30 mins 5 hours.</td>
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<td></td>
<td>5. <strong>Moderate or No Alcohol intake</strong>: 14 units per weeks, if you chose to drink</td>
</tr>
<tr>
<td><strong>Personal Clinical Factors</strong></td>
<td>6. <strong>Body Mass Index or Body Shape</strong>: Optimising body shape for the frame that you have- Ecto, Meso, Endo.</td>
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<tr>
<td></td>
<td>7. <strong>Blood Pressure Control</strong>: Optimising BP for the age group</td>
</tr>
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<td></td>
<td>8. <strong>Cholesterol Care- Statins</strong>: Statins for most over the age of 50 or so.</td>
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<tr>
<td><strong>Clinical Care</strong></td>
<td>9. <strong>Clinical Care and Interventions</strong>: Vaccinations, screening, treatments, surgeries</td>
</tr>
<tr>
<td><strong>The Planet</strong></td>
<td>10. <strong>Planetary Health</strong>: Addressing Inequalities, Climate change, Biodiversity, Pollution, Peace vs War, Crime, Sustainability</td>
</tr>
</tbody>
</table>
Alphabet Strategy for Diabetes Care: "Checklist"

**A Safety "Checklist", Patient-Centred, Multi-Professional, Evidence-based Approach**

### National Diabetes Audit

**Eight Process Checks**
- HbA1c, BP, cholesterol
- Urine albumin, Creatinine
- Foot examination
- BMI and smoking
  
  *(Eye screening)*

### Alphabet Strategy

**Advice**
- Diet and weight control, Physical activity, not smoking, Good Infection Control Measures, Appropriate PPE, COVID-19 Symptoms, appropriate vaccinations

**Blood Pressure:**
- aim ≤ 140/80,
- CVD or CKD ≤ 130/80

**Cholesterol & CKD Prevention**
- Most Atorvastatin 20mg or 80mg, TC ≈ 4 mmol/l
- UACR yearly and treat

**Diabetes Control:**
- HbA1c < 59 (7.5%) usual target, ideal < 48 (6.5%)
- Outcome based Rx: usually SGLT2-i, ? GLP-RA
- Safer insulins where needed

**Eyes:**
- check yearly at least

**Feet:**
- daily self-care, HCP check yearly at least

**Guardian Drugs:**
- ?Aspirin 75mg (CVD atheroma), ?ACE-i, ARBs (esp CKD, HF, CVD), appropriate SGLT2-i (NICE NG-28), GLP-RA

**National Diabetes Audit Targets:**
- BP: ≤140/80 mmHg
- HbA1c: ≤58 mmol/mol
- Cholesterol: <5 mmol/L
- New Target Statins: Primary & Secondary Prevention of CHD

**Healthcare Professional Advice:** (with kindness and compassion)
- Contraception & Pre-conception Advice
- Driving and Occupation Advice
- Hospital Admission Care
- Other individualised advice eg Ramadan, Travel

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The Discovery of Insulin to present day clinical care:
Collip and Colleagues, Complex Care, and Care in the Community

Conclusions

Collip and Colleagues: Important of collaborative research and Clinical Care- there was “Glory Enough for All” and is …

Burden of Diabetes: Urgent need to address, especially prevention of diabetes, diabetes complications, pancreatic transplant research

Complex Care: Need for Healthcare Professional and Patients to implement effective evidence-based care

Caring for the Community: Cultural competence, Individualised, Ethical Clinical Care

Dedicated to my Colleagues- Past and Present
Thank You all for Attending