The Sleeping Giant: Type 2 Diabetes & Sleep Disorders

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"You're on mute."

—2020 Quote of the Year

Korean doctor says those who haven't contracted COVID-19 have no friends

Rebecca Moon · 14 hours ago

Image: KAIST Mommyson


GREGGS


GREGGS

Disclosures 2022

Speaker fees: Amarin, Amgen, AstraZeneca, Boehringer Ingelheim, Daiichi Sankyo, GSK, Lilly, Napp, Novartis, Novo Nordisk

Advisory Board fees: Amarin, Amgen, Ascensia, AstraZeneca, Bayer, Boehringer Ingelheim, GSK, Lilly, Napp, Novartis, Novo Nordisk, Roche, Sanofi

Conference attendance: AstraZeneca, Novo Nordisk

I have many doubts about modern medicine

What Next After Metformin?

Medscape UK X Guidelines

Primary Care Hacks

Author: Dr Kevin Fernando, GP Partner, North Berwick Health Centre; Content Advisor, Medscape Global and UK. Email: kfernando@webmd.net

This Medscape UK Primary Care Hack is intended to help guide our choice of medication for the management of people living with type 2 diabetes. As always, we should take an individualised and holistic approach to the care of people living with type 2 diabetes.

	Biguanides (Metformin)	SGLT2 Inhibitors (Canagliflozin, Dapagliflozin, Empagliflozin, Ertugliflozin)	GLP-1 Receptor Agonists (Dulaglutide, Exenatide, Liraglutide, Lixisenatide, Semaglutide)	DPP-4 Inhibitors or 'Gliptins' (Alogliptin, Linagliptin, Saxagliptin, Sitagliptin, Vildagliptin)	Thiazolidinediones (Pioglitazone)	Sulfonylureas (Gliclazide, Glimepiride, Glipizide)
	Reinforce the importance of 24-hour physical behaviours for T2D. See: *Management of Hyperglycemia in Type 2 Diabetes, 2022. A Consensus Report by the American Diabetes Association and the European Association for the Study of Diabetes*					
Mode of Action	Decreases hepatic glucose production and reduces IR	Insulin-independent; inhibits renal glucose reabsorption by blocking SGLT2 transporter	Stimulates glucose dependent insulin release from the pancreas	Increases GLP-1 levels by blocking DPP-4 enzyme that inactivates GLP-1	Insulin-dependent; reduces hepatic and peripheral IR at a molecular level	Stimulates insulin secretion from pancreatic beta-cells
Glycaemic Efficacy	Moderate/high	Moderate/high	High	Low/moderate	Moderate	High
Impact on	Weight loss +	Weight loss ++	Weight loss +++	Weight neutral	Weight gain +++	Weight gain ++

The Pharmacological Management of Hyperglycaemia in People Living with Type 2 Diabetes and Chronic Kidney Disease

Medscape UK X Guidelines
Primary Care Hacks

Author: Dr Kevin Fernando, GP Partner, North Berwick Health Centre; Content Advisor, Medscape Global and UK. Email: kfernando@webmd.net

● No dose adjustment needed ● Dose adjustment or further action recommended ● Not recommended

	CKD stage (ml/min/m²)				
	Stages G1 and G2 eGFR ≥60	Stage G3a eGFR 45–59	Stage G3b eGFR 30–44	Stage G4 eGFR 15–30	Stage G5 eGFR <15
Metformin	3 g total maximum daily dose (in 2–3 daily doses)	2 g total maximum daily dose (in 2–3 daily doses)	1 g total maximum daily dose (in 2–3 daily doses)		
Sulfonylureas		Increased risk of hypoglycaemia if eGFR <60. Consider reducing dose. Gliclazide and glipizide preferred as metabolised in the liver			
Repaglinide					
Acarbose					Avoid if CrCl <25 ml/min/1.73 m²
Pioglitazone					Avoid in those on dialysis
Alogliptin			Reduce to 12.5 mg od if CrCl ≤50 ml/min	Reduce to 6.25 mg od if CrCl <30 ml/min or dialysis required	
Linagliptin					
Saxagliptin		Reduce to 2.5 mg od			Avoid in those on dialysis
Sitagliptin			Reduce to 50 mg od	Reduce to 25 mg od	
Vildagliptin			Reduce to 50 mg od if CrCl <50 ml/min		
Canagliflozin	Initiate 100 mg and titrate to 300 mg if additional glycaemic improvement required	Initiate or continue 100 mg only	All SGLT2 inhibitors have negligible glucose-lowering effects once eGFR falls below 45. Consider adding an additional glucose-lowering agent if further glycaemic improvement is required		
Dapagliflozin	Recommended dose is 10 mg		Certain SGLT2 inhibitors have beneficial cardio–renal effects at all stages of renal impairment and should be continued *See The Medscape UK Primary Care Hack, Extra-Glycaemic Indications of SGLT2 Inhibitors,* for use of SGLT2 inhibitors in this context		

Extra-Glycaemic Indications of SGLT2 Inhibitors

Medscape UK X Guidelines
Primary Care Hacks

Author: Dr Kevin Fernando, GP Partner, North Berwick Health Centre and Content Advisor, Medscape Global and UK
Email: kfernando@webmd.net

● **Initiate or continue as described** ● **Continue as described** ● **Not recommended**

SGLT2	Indication	CKD stage (mL/min/1.73 m²)				
		Stages G1 and G2 eGFR ≥60	Stage G3a eGFR 45–59	Stage G3b eGFR 30–44	Stage G4 eGFR 15–30	Stage G5 eGFR <15
Canagliflozin	Treatment of diabetic kidney disease in adults with T2D as add-on to standard of care	Initiate or continue 100 mg			If urinary ACR ≥30 mg/mmol, continue 100 mg and continue dosing until dialysis or renal transplantation. Do not initiate if eGFR <30	
Dapagliflozin	Treatment of symptomatic chronic HFrEF in adults with or without T2D	Initiate or continue 10 mg				No lower eGFR limit for continuation. It is not recommended to initiate if eGFR <15
	Treatment of CKD in adults with or without T2D	Initiate or continue 10 mg*				No lower eGFR limit for continuation. It is not recommended to initiate if eGFR <15
Empagliflozin	Treatment of symptomatic chronic heart failure regardless of ejection fraction (HFrEF and HFpEF) in adults with or without T2D	Initiate or continue 10 mg				Not recommended if eGFR <20
	Cardiovascular risk reduction as add-on to standard of care in adults with T2D and established cardiovascular disease	Initiate or continue 10 mg			Not recommended if eGFR <30	

- The glucose-lowering efficacy of all SGLT2 inhibitors is dependent on renal function and is reduced when eGFR <45 and likely absent in people with severe renal impairment. Therefore, if eGFR falls <45, additional glucose-lowering treatment should be considered in people living with T2D.
- SGLT2 inhibitors are not recommended for people living with T1D.

* NICE TA775 and SMC2428 advise initiation in people with eGFR 25–75 and type 2 diabetes or ACR ≥22.6 mg/mmol (≥23 mg/mmol in SMC2428)

Table based on author's interpretation of relevant summaries of product characteristics. At time of publication, ertugliflozin has no extra-glycaemic indications.

Abbreviations: ACR: albumin/creatinine ratio; **CKD:** chronic kidney disease; **eGFR:** estimated glomerular filtration rate; **HFpEF:** heart failure with preserved ejection fraction; **HFrEF:** heart failure with reduced ejection fraction; **NICE TA:** NICE technology appraisal; **SGLT2:** sodium–glucose cotransporter 2; **SMC:** Scottish Medicines Consortium; **T1D:** type 1 diabetes; **T2D:** type 2 diabetes.

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1. Napp Pharmaceuticals Limited. Invokana 100 mg and 300 mg film-coated tablets—summary of product characteristics. www.medicines.org.uk/emc/ (accessed 8 August 2022).
2. AstraZeneca UK Limited. Forxiga 10 mg film-coated tablets—summary of product characteristics. www.medicines.org.uk/emc/ (accessed 8 August 2022).
3. Boehringer Ingelheim Limited. Jardiance 10 mg film-coated tablets—summary of product characteristics. www.medicines.org.uk/emc/ (accessed 8 August 2022).

ADA/EASD and NICE Recommendations on the Pharmacological Management of Type 2 Diabetes in Adults

Medscape UK X Guidelines
Primary Care Hacks

Authors: *Guidelines* editorial team, email: guidelines@webmd.net; Dr Kevin Fernando, GP Partner, North Berwick Health Centre; Content Advisor, Medscape Global and UK, email: kfernando@webmd.net

This Medscape UK Primary Care Hack highlights key recommendations from the American Diabetes Association/European Association for the Study of Diabetes and NICE on the management of hyperglycaemia in adults with T2D. As always, we should take an individualised and holistic approach to the care of people living with T2D.

ADA/EASD (2022)

INITIAL THERAPY

Implement comprehensive lifestyle measures for all people with T2D, including physical activity, weight reduction (including weight reduction medications), treatment adherence, nutrition, adequate sleep, and smoking cessation

DSMES should be offered on an ongoing basis, and be provided by trained diabetes care and education specialists

For treatment of hyperglycaemia, metformin remains the agent of choice in most people with diabetes

Other classes of agents are useful in combination with metformin or when metformin is contraindicated or not tolerated, with agent selection determined by the balance between the glucose-lowering efficacy and the side-effect profile of the individual agents[A]

Consider initial combination therapy with glucose-lowering agents, especially in those with high HbA_{1c} at diagnosis (i.e., >70 mmol/mol [>8.5%]), in younger people with T2D (regardless of HbA_{1c}), and in those in whom a stepwise approach would delay access to agents that provide cardio–renal protection beyond their glucose-lowering effects

Reinforce the importance of 24-hour physical behaviours (see Figure 2 in the full consensus statement):

- sitting/breaking up prolonged periods of sitting

NICE (2022)

FIRST-LINE TREATMENT

Assess HbA_{1c}, CV risk, and kidney function[F]

Reinforce advice about diet, lifestyle, and adherence to drug treatment if HbA_{1c} levels are not adequately controlled by a single drug and rise to ≥58 mmol/mol (7.5%)

Not at High CVD Risk	CHF or Established ASCVD[H]	High Risk of CVD (QRISK2 ≥10%)
Offer standard-release metformin or if GI disturbance, metformin MR If metformin contraindicated consider: • DPP-4 inhibitor **or** • pioglitazone **or** • sulfonylurea • an SGLT2i for some people (canagliflozin, dapagliflozin, empagliflozin, ertugliflozin)[G]	Offer standard-release metformin or if GI disturbance, metformin MR And, as soon as metformin tolerability is confirmed,[I] **offer** SGLT2i with proven CV benefit If metformin contraindicated **offer** SGLT2i alone[G]	Offer standard-release metformin or if GI disturbance, metformin MR And, as soon as metformin tolerability is confirmed,[I] **consider** SGLT2i with proven CV benefit If metformin contraindicated **consider** SGLT2i alone[G]

T2D & Sleep Disorders: Learning Objectives

i. Waking up to the importance of duration & quality of sleep as major metabolic risk factors

ii. Double Trouble: the bidirectional association of T2D & Obstructive Sleep Apnoea/Hypopnoea Syndrome (OSAHS)

iii. Rise & shine: practicing healthy sleep hygiene

Diabetologia
https://doi.org/10.1007/s00125-022-05787-2

CONSENSUS REPORT

Management of hyperglycaemia in type 2 diabetes, 2022. A consensus report by the American Diabetes Association (ADA) and the European Association for the Study of Diabetes (EASD)

Melanie J. Davies[1,2] · Vanita R. Aroda[3] · Billy S. Collins[4] · Robert A. Gabbay[5] · Jennifer Green[6] · Nisa M. Maruthur[7] · Sylvia E. Rosas[8] · Stefano Del Prato[9] · Chantal Mathieu[10] · Geltrude Mingrone[11,12,13] · Peter Rossing[14,15] · Tsvetalina Tankova[16] · Apostolos Tsapas[17,18] · John B. Buse[19]

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Abstract
The American Diabetes Association and the European Association for the Study of Diabetes convened a panel to update the previous consensus statements on the management of hyperglycaemia in type 2 diabetes in adults, published since 2006 and last updated in 2019. The target audience is the full spectrum of the professional healthcare team providing diabetes care in the USA and Europe. A systematic examination of publications since 2018 informed new recommendations. These include additional focus on social determinants of health, the healthcare system and physical activity behaviours including sleep. There is a greater emphasis on weight management as part of the holistic approach to diabetes management. The results of cardiovascular and kidney outcomes trials involving sodium–glucose cotransporter-2 inhibitors and glucagon-like peptide-1 receptor agonists, including assessment of subgroups, inform broader recommendations for cardiorenal protection in people with diabetes at high risk of cardiorenal disease. After a summary listing of consensus recommendations, practical tips for implementation are provided.

Keywords Cardiovascular disease · Chronic kidney disease · Glucose-lowering therapy · Guidelines · Heart failure · Holistic care · Person-centred care · Social determinants of health · Type 2 diabetes mellitus · Weight management

This article is being simultaneously published in *Diabetologia* (https://doi.org/10.1007/s00125-022-05787-2) and *Diabetes Care* (https://doi.org/10.2337/dci22-0034) by the European Association for the Study of Diabetes and American Diabetes Association.

A consensus report of a particular topic contains a comprehensive examination and is authored by an expert panel and represents the panel's collective analysis, evaluation and opinion. MJD and JBB were co-chairs for the Consensus Report Writing Group. VRA, BSC, RAG, JG, NMM and SER were the writing group members for ADA. SDP, CM, GM, PR, TT and AT were the writing group members for EASD. The article was reviewed for EASD by its Committee on Clinical Affairs and approved by its Executive Board. The article was reviewed for ADA by its Professional Practice Committee.

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✉ John B. Buse (for *Diabetes Care*)
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Extended author information available on the last page of the article

Abbreviations

BGM	Blood glucose monitoring
CGM	Continuous glucose monitoring
CSII	Continuous subcutaneous insulin infusion
CVOT	Cardiovascular outcomes trial
DKA	Diabetic ketoacidosis
DPP-4i	Dipeptidyl peptidase-4 inhibitors
DSMES	Diabetes self-management education and support
ETD	Estimated treatment difference
GIP	Glucose-dependent insulinotropic polypeptide
GLP-1 RA	Glucagon-like peptide-1 receptor agonist(s)
HF	Heart failure
HHF	Hospitalisation for heart failure
MACE	Major adverse cardiovascular events
MNT	Medical nutrition therapy
NAFLD	Non-alcoholic fatty liver disease
NASH	Non-alcoholic steatohepatitis
SGLT1i	Sodium–glucose cotransporter-1 inhibitor

IMPORTANCE OF 24-HOUR PHYSICAL BEHAVIOURS FOR TYPE 2 DIABETES

SITTING/BREAKING UP PROLONGED SITTING

Limit sitting. Breaking up prolonged sitting (every 30 min) with short regular bouts of slow walking/simple resistance exercises can improve glucose metabolism.

STEPPING

- An increase of only 500 steps/day is associated with 2–9% decreased risk of cardiovascular morbidity and all-cause mortality.
- A 5 to 6 min brisk intensity walk per day equates to ~4 years' greater life expectancy.

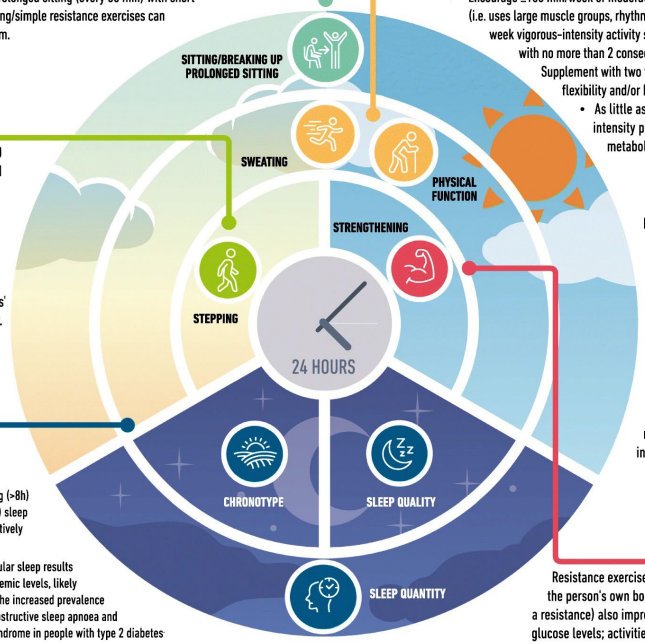
SLEEP

Aim for consistent, uninterrupted sleep, even on weekends.

Quantity – Long (>8h) and short (<6h) sleep durations negatively impact HbA_{1c}.

Quality – Irregular sleep results in poorer glycaemic levels, likely influenced by the increased prevalence of insomnia, obstructive sleep apnoea and restless leg syndrome in people with type 2 diabetes

Chronotype – Evening chronotypes (i.e. night owl: go to bed late and get up late) may be more susceptible to inactivity and poorer glycaemic levels vs morning chronotypes (i.e. early bird: go to bed early and get up early).



SWEATING (MODERATE-TO-VIGOROUS ACTIVITY)

- Encourage ≥150 min/week of moderate-intensity physical activity (i.e. uses large muscle groups, rhythmic in nature) OR ≥75 min/week vigorous-intensity activity spread over ≥3 days/week, with no more than 2 consecutive days of inactivity. Supplement with two to three resistance, flexibility and/or balance sessions.
  - As little as 30 min/week of moderate-intensity physical activity improves metabolic profiles.

Physical function/frailty/ sarcopenia

- The frailty phenotype in type 2 diabetes is unique, often encompassing obesity alongside physical frailty, at an earlier age. The ability of people with type 2 diabetes to undertake simple functional exercises in middle-age is similar to that in those over a decade older.

STRENGTHENING

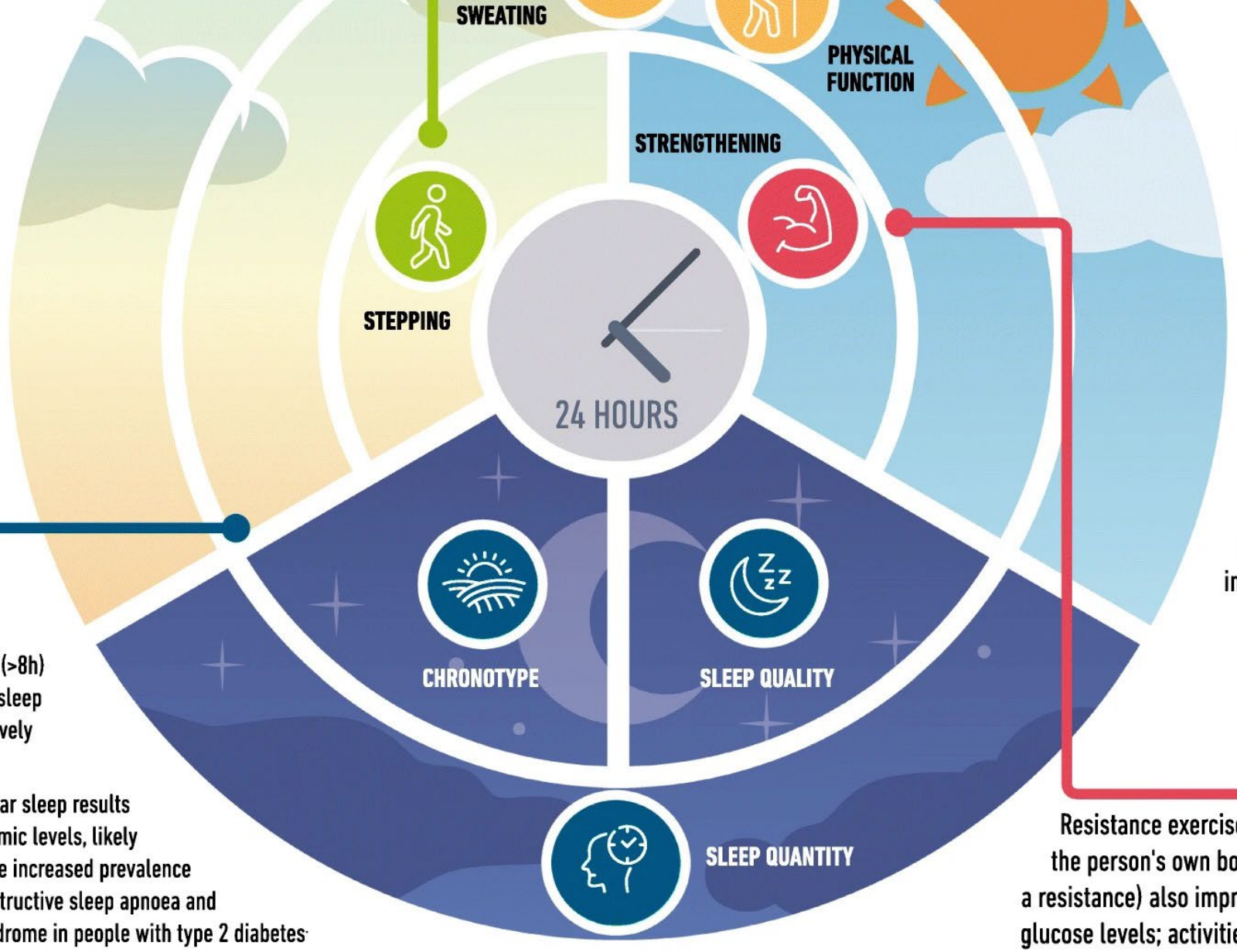
Resistance exercise (i.e. any activity that uses the person's own body weight or works against a resistance) also improves insulin sensitivity and glucose levels; activities like tai chi and yoga also encompass elements of flexibility and balance.

	Glucose/insulin	Blood pressure	HbA_{1c}	Lipids	Physical function	Depression	Quality of life
SITTING/BREAKING UP PROLONGED SITTING	↓	↓	↓	↓	↑	↓	↑
STEPPING	↓	↓	↓	↓	↑	↓	↑
SWEATING (MODERATE-TO-VIGOROUS ACTIVITY)	↓	↓	↓	↓	↑	↓	↑
STRENGTHENING	↓	↓	↓	↓	↑	↓	↑
ADEQUATE SLEEP DURATION	↓	↓	↓	↓	?	↓	↑
GOOD SLEEP QUALITY	↓	↓	↓	↓	?	↓	↑
CHRONOTYPE/CONSISTENT TIMING	↓	?	↓	?	?	↓	?

IMPACT OF PHYSICAL BEHAVIOURS ON CARDIOMETABOLIC HEALTH IN PEOPLE WITH TYPE 2 DIABETES

↑ **Higher levels/improvement** (physical function, quality of life); ↓ **Lower levels/improvement** (glucose/insulin, blood pressure, HbA_{1c}, lipids, depression); ? no data available;
↑ **Green arrows = strong evidence;** ↑ **Yellow arrows = medium strength evidence;** ↑ **Red arrows = limited evidence.**

- An increase of only 500 steps/day is associated with 2-9% decreased risk of cardiovascular morbidity and all-cause mortality.
- A 5 to 6 min brisk intensity walk per day equates to ~4 years' greater life expectancy.



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Quality – Irregular sleep results in poorer glycaemic levels, likely influenced by the increased prevalence of insomnia, obstructive sleep apnoea and restless leg syndrome in people with type 2 diabetes.

Chronotype – Evening chronotypes (i.e. night owl: go to bed late and get up late) may be more susceptible to inactivity and poorer glycaemic levels vs morning chronotypes (i.e. early bird: go to bed early and get up early).

Physical function/ sarcopenia

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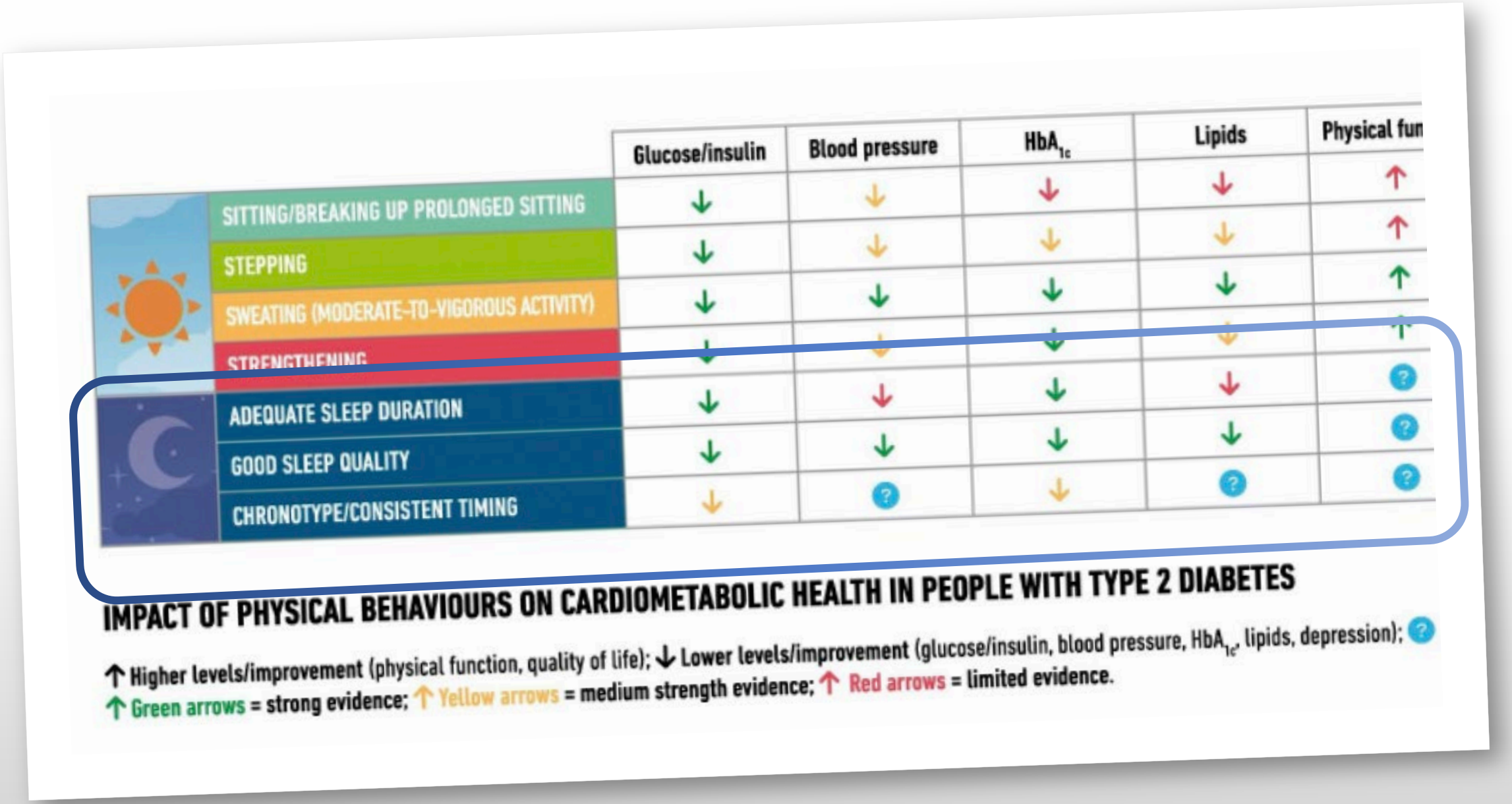
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Blood pressure
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↑ Green arrows = strong evidence; ↑ Yellow arrows = medium strength evidence; ↑ Red arrows = limited evidence.

This is your life

79 YEARS
28,835 DAYS

The one activity you spend most of your life doing is sleep. But how does it compare to work, socialising and laughing? The average human spends roughly 79 years, or 28,835 days on Earth. Each bead in this jar represents one year.

IN BED · WORK · SCREEN TIME · EATING · HOLIDAYS
ROMANCE · SOCIALISING · EXERCISE · SCHOOL · THE REST

NEWS

Massive Decline in Sleep Quality In the Past Year

Dr Sheena Meredith, MB BS, MPhil | Disclosures | 27 September 2022

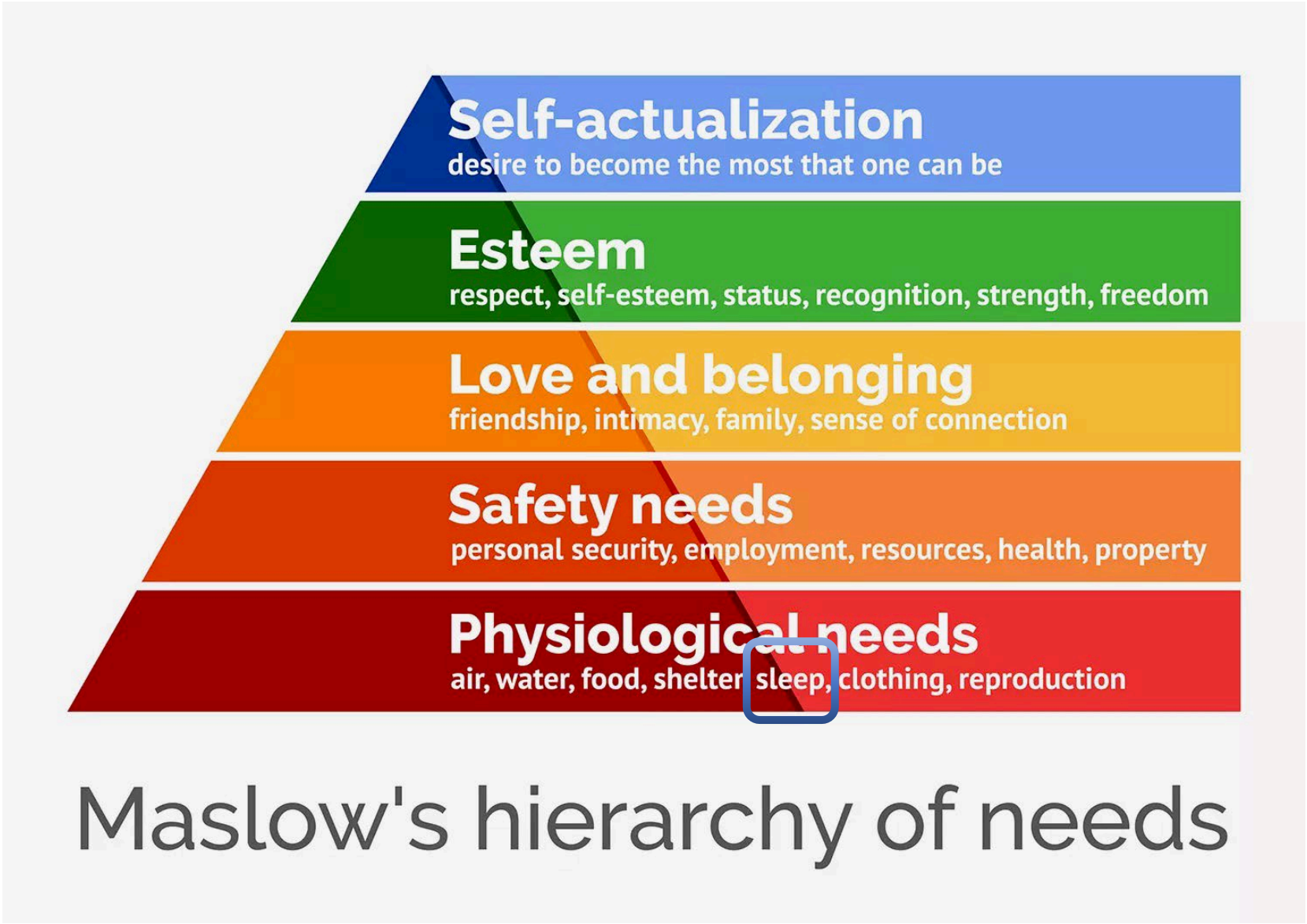
A majority of adults now report poorer quality sleep compared with a year ago, according to new survey results released by healthcare charity Nuffield Health that revealed soaring numbers suffering from insomnia.

The new research is the latest set of results to be released from Nuffield's 2022 Healthier Nation Index (HNI), based on a nationally representative online survey conducted by Censuswide of 8000 adults aged 16+ across the UK questioned between February 14-28 this year. The survey findings were released this week to coincide with this month's 'Sleeptember', an annual awareness campaign by The Sleep Charity, which focuses on promoting better sleep quality.

The Sleep Charity pointed out that just one bad night's sleep can affect mood, concentration and alertness, while a good night's sleep can help to fight minor ailments, deal better with depression and even tackle weight problems.

Early Intervention is Key

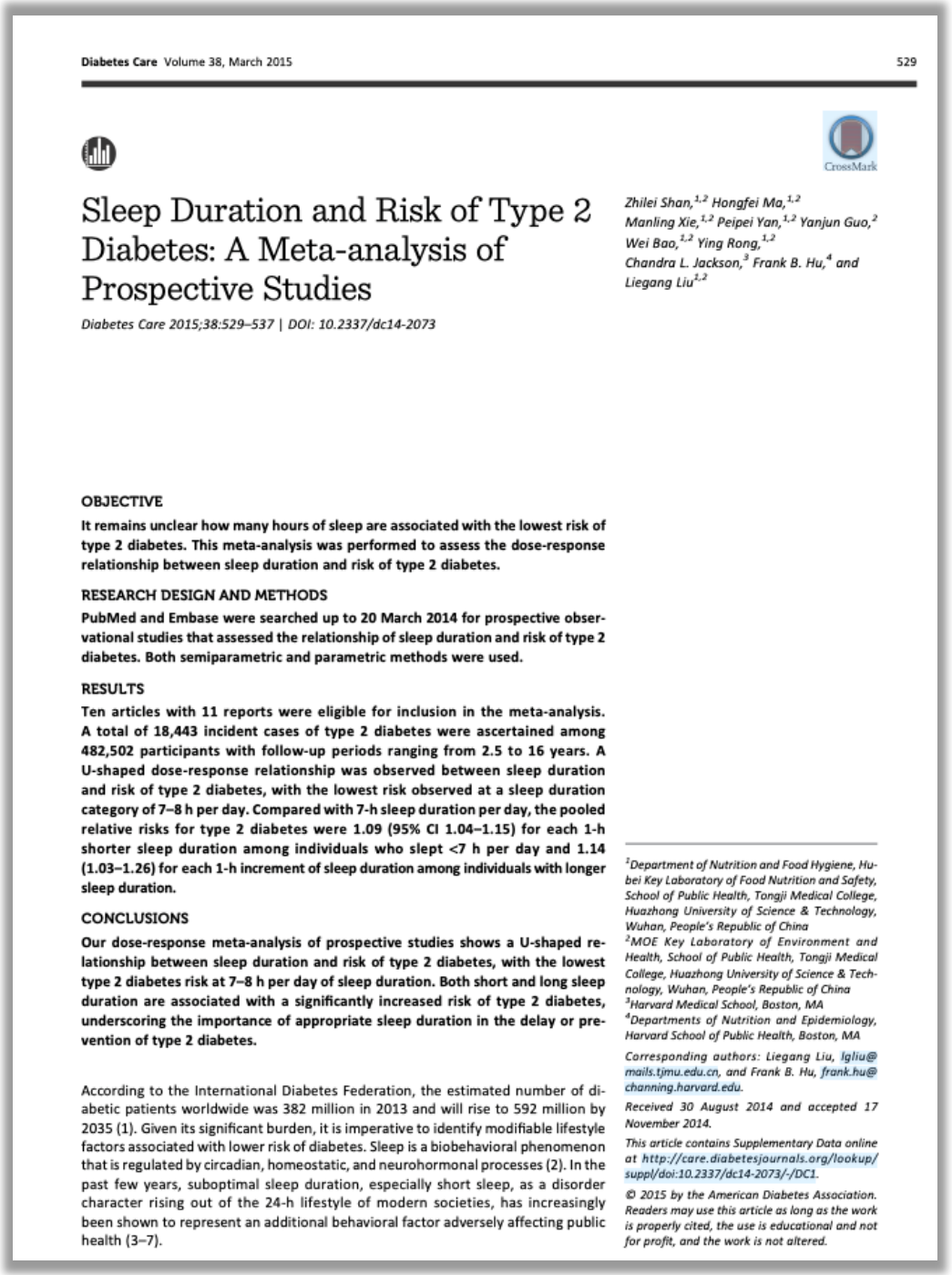
Lisa Artis, deputy CEO of The Sleep Charity, told *Medscape News UK*: "Chronic sleep deprivation has been linked to a number of serious physical and mental health issues including heart disease, stroke, obesity, high blood pressure, depression and Alzheimer's. Not only is there a health impact but also lack of sleep has a significant effect on relationships, work and people's social lives.


Self-actualization
desire to become the most that one can be
Esteem
respect, self-esteem, status, recognition, strength, freedom
Love and belonging
friendship, intimacy, family, sense of connection
Safety needs
personal security, employment, resources, health, property
Physiological needs
air, water, food, shelter, sleep, clothing, reproduction
Maslow's hierarchy of needs


Self-Actualisation
Pursue Inner Talent
Creativity Fulfilment
Self-Esteem
Achievement Mastery
Recognition Respect
Belonging – Love
Friends Family Spouse Lover
Safety
Security Stability Freedom From Fear
Physiological
Food Water Shelter Warmth
WIFI

T2D & Sleep Disorders: Learning Objectives

- Waking up to the importance of duration & quality of sleep as major metabolic risk factors



Sleep Duration and Risk of Type 2 Diabetes: A Meta-analysis of Prospective Studies

Zhilei Shan,[1,2] Hongfei Ma,[1,2] Manling Xie,[1,2] Peipei Yan,[1,2] Yanjun Guo,[2] Wei Bao,[1,2] Ying Rong,[1,2] Chandra L. Jackson,[3] Frank B. Hu,[4] and Liegang Liu[1,2]

Diabetes Care 2015;38:529–537 | DOI: 10.2337/dc14-2073

OBJECTIVE

It remains unclear how many hours of sleep are associated with the lowest risk of type 2 diabetes. This meta-analysis was performed to assess the dose-response relationship between sleep duration and risk of type 2 diabetes.

RESEARCH DESIGN AND METHODS

PubMed and Embase were searched up to 20 March 2014 for prospective observational studies that assessed the relationship of sleep duration and risk of type 2 diabetes. Both semiparametric and parametric methods were used.

RESULTS

Ten articles with 11 reports were eligible for inclusion in the meta-analysis. A total of 18,443 incident cases of type 2 diabetes were ascertained among 482,502 participants with follow-up periods ranging from 2.5 to 16 years. A U-shaped dose-response relationship was observed between sleep duration and risk of type 2 diabetes, with the lowest risk observed at a sleep duration category of 7–8 h per day. Compared with 7-h sleep duration per day, the pooled relative risks for type 2 diabetes were 1.09 (95% CI 1.04–1.15) for each 1-h shorter sleep duration among individuals who slept <7 h per day and 1.14 (1.03–1.26) for each 1-h increment of sleep duration among individuals with longer sleep duration.

CONCLUSIONS

Our dose-response meta-analysis of prospective studies shows a U-shaped relationship between sleep duration and risk of type 2 diabetes, with the lowest type 2 diabetes risk at 7–8 h per day of sleep duration. Both short and long sleep duration are associated with a significantly increased risk of type 2 diabetes, underscoring the importance of appropriate sleep duration in the delay or prevention of type 2 diabetes.

According to the International Diabetes Federation, the estimated number of diabetic patients worldwide was 382 million in 2013 and will rise to 592 million by 2035 (1). Given its significant burden, it is imperative to identify modifiable lifestyle factors associated with lower risk of diabetes. Sleep is a biobehavioral phenomenon that is regulated by circadian, homeostatic, and neurohormonal processes (2). In the past few years, suboptimal sleep duration, especially short sleep, as a disorder character rising out of the 24-h lifestyle of modern societies, has increasingly been shown to represent an additional behavioral factor adversely affecting public health (3–7).

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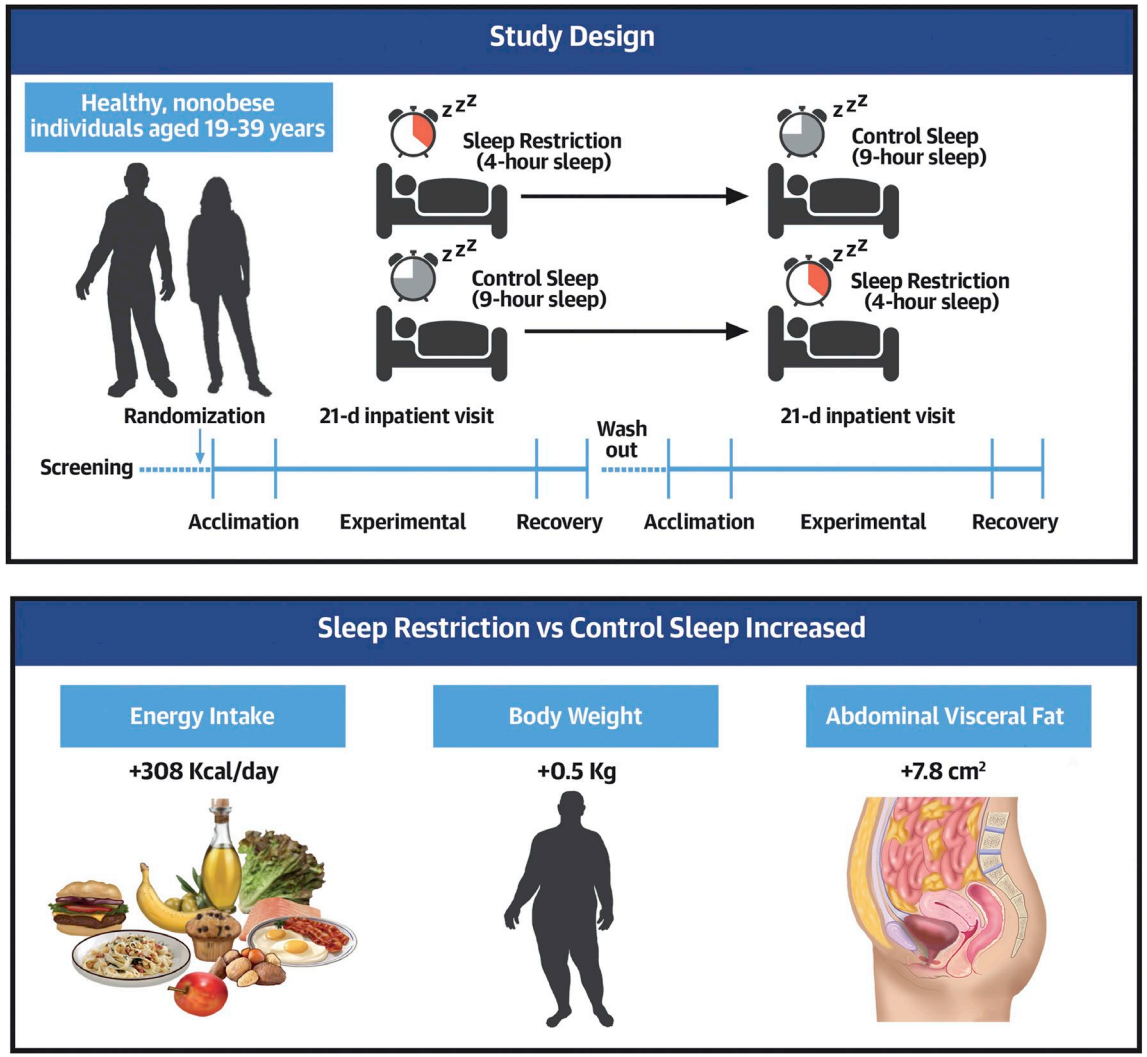
This article contains Supplementary Data online at http://care.diabetesjournals.org/lookup/suppl/doi:10.2337/dc14-2073/-/DC1.

- U-shaped associated with excessively short and overly long sleep durations ↑ risk of T2D – lowest risk 7-8 hours
- 1 hour ↓ in sleep duration below 7 hours ↑ T2D risk by 9%
- 1 hour ↑ in sleep duration above 7 hours ↑ T2D risk by 14%

CENTRAL ILLUSTRATION: Effects of Experimental Sleep Restriction on Obesity Risk



Covassin N, et al. J Am Coll Cardiol. 2022;79(13):1254-1265.

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DOI: 10.1002/dmrr.2930

WILEY

RESEARCH ARTICLE

Risk of type 2 diabetes in patients with insomnia: A population-based historical cohort study

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Abstract

Background: We investigated the risk of type 2 diabetes mellitus (T2DM) in patients with and without insomnia.

Methods: In this historical cohort study, we performed a secondary analysis of data from 2001 to 2010, which was obtained from Taiwan's National Health Insurance Database. We developed a Cox proportional hazard regression model to estimate the effects of insomnia on T2DM risk. Kaplan-Meier survival analysis was applied to compare the differences in the cumulative incidence of T2DM between the groups with and without insomnia.

Results: During the follow-up period, the T2DM incidence rate of patients with insomnia was significantly higher than that of patients without insomnia (34.7 vs 24.3 per 1000 person-years). Overall, patients with insomnia had a higher risk of T2DM than did patients without insomnia (adjusted hazard ratio, 1.16; 95% confidence interval [CI], 1.10-1.19). Among patients aged younger than 40 years, those with insomnia had a higher risk of T2DM than did the comparison cohort (adjusted hazard ratio, 1.31; 95% CI, 1.14-1.55). Compared with patients without insomnia, the risk tended to increase with the duration of follow-up in patients with insomnia; when the insomnia duration was <4 years, 4 to 8 years, and >8 years, the risk of T2DM increased by 1.14, 1.38, and 1.51 times (95% CI, 1.03-1.17, 1.15-1.49, and 1.20-1.86), respectively. Patients with insomnia had a higher risk of T2DM, and this risk was particularly pronounced among the younger (≤40 years) population.

Conclusion: Chronic insomnia could be an important risk factor for T2DM.

KEYWORDS
historical cohort study, insomnia, risk factor, type 2 diabetes

1 | INTRODUCTION

Insomnia is a common sleep disorder that affects 25% of Taiwan's adults,[1] and persistent insomnia is associated with mortality.[2] In addition, a growing body of evidence suggests that insomnia is correlated with the prevalence of chronic diseases such as hypertension (HT)[3] and hypercholesterolemia;[4] however, the main mechanism underlying the association between insomnia and chronic diseases remains unclear.

Studies have indicated that sleep plays an important role in the regulation of neuroendocrine function and metabolism in adults.[5,6] Although insomnia has been associated with type 2 diabetes mellitus (T2DM),[7-9] whether this association holds true both for chronic and intermittent insomnia remains unknown, and the possibility of a time-dependent cumulative effect between the risk of T2DM and insomnia remains scarce.

Some studies have reported inconsistent results for the association between insomnia and T2DM, [10-12] and additional studies are required to investigate this public health issue. Compared with western countries, few studies have examined the association between insomnia and T2DM risk in Taiwan. Hence, this study used data from Taiwan's National Health Insurance Database (NHIRD) to explore the risk of T2DM in patients with insomnia and to stratify the T2DM risk according to the insomnia duration of follow-up.

2 | MATERIALS AND METHODS

2.1 | Data sources

Taiwan's NHIRD was developed when Taiwan established a universal health care system in 1995. It includes the medical records of the

- Those with insomnia, had a 16% ↑ risk of T2D
- The risk of developing T2D was higher among those <40 years of age
- Duration of insomnia mattered: <4 years 14% ↑ risk, >8 years 51% ↑ risk

Check for updates

Sleep behaviours and associated habits and the progression of pre-diabetes to type 2 diabetes mellitus in adults: A systematic review and meta-analysis

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May-June 2022: 1–11

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SAGE

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Abstract

Introduction: Certain sleep behaviours increase risk of type 2 diabetes mellitus (T2DM) in the general population, but whether they contribute to the progression from pre-diabetes to T2DM is uncertain. We conducted a systematic review to assess this.

Methods: Structured searches were performed on bibliographic databases (MEDLINE, EMBASE and CINAHL) from inception to 26/04/2021 for longitudinal studies/trials consisting of adults≥18 years with pre-diabetes and sleep behaviours (short or long sleep duration (SD), late chronotype, insomnia, obstructive sleep apnoea, daytime napping and/or night shift employment) that reported on incident T2DM or glycaemic changes. The Newcastle-Ottawa Scale was used for quality assessment.

Results: Six studies were included. Meta-analysis of three studies ($n = 20,139$) demonstrated that short SD was associated with greater risk of progression to T2DM, hazard ratio (HR) 1.59 (95% CI 1.29–1.97), I^2 heterogeneity score 0%, $p < 0.0001$, but not for long SD, HR 1.50 (0.86–2.62), I^2 heterogeneity 77%, $p = 0.15$. The systematic review showed insomnia and night shift duty were associated with higher progression to T2DM. Studies were rated as moderate-to-high quality.

Conclusions: Progression from pre-diabetes to T2DM increases with short SD, but only limited data exists for insomnia and night shift duty. Whether manipulating sleep could reduce progression from pre-diabetes to T2DM needs to be examined.

Keywords

Pre-diabetes, type 2 diabetes mellitus, sleep disorders, systematic review

Introduction

Pre-diabetes (also known as non-diabetic hyperglycaemia) represents a state where glucose levels are above the normal defined range, but lower than the diagnostic thresholds for type 2 diabetes mellitus (T2DM).[1–5] People with pre-diabetes are at higher risk of progressing to T2DM than people with normoglycaemia. Thus, pre-diabetes is considered an important target for T2DM prevention strategies.[5,6] As the prevalence of T2DM is increasing

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- Short sleep duration (<5-6 hours/night) 59% ↑ risk of progression from pre-diabetes to T2D
- Shift work also impacts risk – do we know which of our patients work shifts?

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CLINICAL REVIEW

The impact of sleep amount and sleep quality on glycemic control in type 2 diabetes: A systematic review and meta-analysis

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SUMMARY

Recent epidemiological studies have suggested that there is an association between glycemic control and sleep disturbances in patients with type 2 diabetes, but the extent is unclear. A systematic literature search was performed in nine electronic databases from inception until August 2015 without any language restriction. The search identified 20 studies (eight studies reporting duration of sleep and 15 studies evaluating sleep quality), and 15 were included in the meta-analysis. Short and long sleep durations were associated with an increased hemoglobin A_{1c} (HbA1c) (weighted mean difference (WMD): 0.23% [0.10–0.36], short sleep; WMD: 0.13% [0.02–0.25], long sleep) compared to normal sleep, suggesting a U-shaped dose–response relationship. Similarly, poor sleep quality was associated with an increased HbA1c (WMD: 0.35% [0.12–0.58]). Results of this study suggest that amount of sleep as well as quality of sleep is important in the metabolic function of type 2 diabetes patients. Further studies are needed to identify for the potential causal role between sleep and altered glucose metabolism.

Introduction

The prevalence of sleep disturbances and deprivation has been increasing dramatically over the past decade, together with the growing epidemic of type 2 diabetes mellitus (T2DM) and obesity worldwide. Recent epidemiological studies suggest that nearly two-fifth of American adults sleep less than 7 h of sleep per day [1], resulting in feelings of fatigue as well as reduced physical activities. Sleep deprivation is thought to affect a variety of body functions including metabolic health [2], endocrine system [3] as well as immune pathway [4]. Specifically, sleep disturbance, insufficient or excessive sleep, and irregular sleep wake patterns have been associated with adverse outcomes such as obesity and impaired glucose metabolism [5].

Recent observational evidence suggests that both sleep duration and sleep quality are linked to metabolic health in adults. For example, a cross-sectional analysis of the Fukuoka diabetes registry, including 4870 T2DM patients showed a clear association between short or long duration of sleep with higher hemoglobin A_{1c} (HbA1c) levels. This association was significant even after adjusting for obesity, total energy intake and depressive symptoms, suggesting that these patients should be considered high risk for poor glycemic control. Similarly, analysis of data from the Nurses' health study, involving 935 female nurses showed that short (≤5 h per night) sleep duration is associated with higher HbA1c levels [6]. While several meta-analyses have confirmed the independent association between sleep duration and sleep quality with the risk of developing T2DM [7,8], there is currently no review which examines the global evidence for the causal link between how deranged sleep can affect glycemic control in patients with T2DM. This study aims to assess the epidemiological evidence and systematically examines the relationship between glucose control in patients with T2DM and the amount of sleep as well as quality of sleep.

Abbreviations: AHI, apnea-hypopnea index; CI, confidence interval; HbA1c, hemoglobin A_{1c}; MOOSE, meta-analyses and systematic reviews of observational studies; OSA, obstructive sleep apnea; PSQI, Pittsburg sleep quality index; T2DM, type 2 diabetes mellitus; UKPDS, UK prospective diabetes study; WMD, weighted mean difference.

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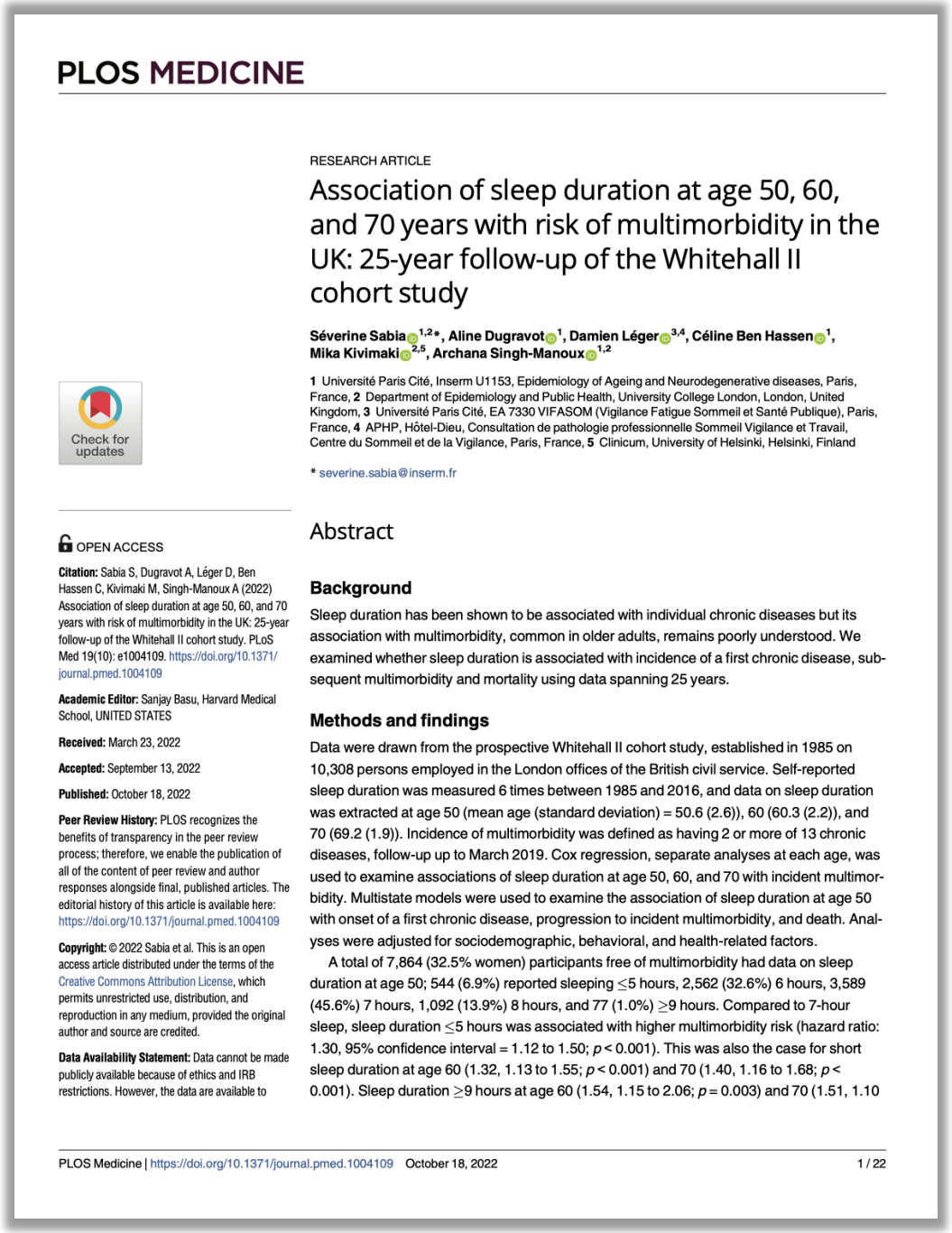
1087-0792/

Materials and methods

Data sources and searches

We performed a systematic search on PubMed, CENTRAL, Embase, PsycInfo, CINAHL Plus, OpenGrey, DART-Europe,

- U-shaped relationship between sleep duration & HbA1c levels
- Specifically, sufficient sleep as well as good quality sleep ↓ HbA1c by up to 0.35% (extrapolate UKPDS data 3% ↓ death, 2% ↓ MI & 5% ↓ microvascular)
- Sleep health is an important modifiable risk factor for improving glycaemic control in people living with T2D



PLOS MEDICINE

RESEARCH ARTICLE

Association of sleep duration at age 50, 60, and 70 years with risk of multimorbidity in the UK: 25-year follow-up of the Whitehall II cohort study

Séverine Sabia[1,2]*, Aline Dugravot[1], Damien Léger[3,4], Céline Ben Hassen[1], Mika Kivimaki[2,5], Archana Singh-Manoux[1,2]

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Data Availability Statement: Data cannot be made publicly available because of ethics and IRB restrictions. However, the data are available to

Abstract

Background

Sleep duration has been shown to be associated with individual chronic diseases but its association with multimorbidity, common in older adults, remains poorly understood. We examined whether sleep duration is associated with incidence of a first chronic disease, subsequent multimorbidity and mortality using data spanning 25 years.

Methods and findings

Data were drawn from the prospective Whitehall II cohort study, established in 1985 on 10,308 persons employed in the London offices of the British civil service. Self-reported sleep duration was measured 6 times between 1985 and 2016, and data on sleep duration was extracted at age 50 (mean age (standard deviation) = 50.6 (2.6)), 60 (60.3 (2.2)), and 70 (69.2 (1.9)). Incidence of multimorbidity was defined as having 2 or more of 13 chronic diseases, follow-up up to March 2019. Cox regression, separate analyses at each age, was used to examine associations of sleep duration at age 50, 60, and 70 with incident multimorbidity. Multistate models were used to examine the association of sleep duration at age 50 with onset of a first chronic disease, progression to incident multimorbidity, and death. Analyses were adjusted for sociodemographic, behavioral, and health-related factors.

A total of 7,864 (32.5% women) participants free of multimorbidity had data on sleep duration at age 50; 544 (6.9%) reported sleeping ≤5 hours, 2,562 (32.6%) 6 hours, 3,589 (45.6%) 7 hours, 1,092 (13.9%) 8 hours, and 77 (1.0%) ≥9 hours. Compared to 7-hour sleep, sleep duration ≤5 hours was associated with higher multimorbidity risk (hazard ratio: 1.30, 95% confidence interval = 1.12 to 1.50; $p < 0.001$). This was also the case for short sleep duration at age 60 (1.32, 1.13 to 1.55; $p < 0.001$) and 70 (1.40, 1.16 to 1.68; $p < 0.001$). Sleep duration ≥9 hours at age 60 (1.54, 1.15 to 2.06; $p = 0.003$) and 70 (1.51, 1.10

- Short sleep duration (≤5 hours) is associated with risk of chronic disease & multimorbidity at all ages
- Long sleep duration (≥9 hours) was associated with multimorbidity only ≥60 years

pari passu

[**pah**-ree **pahs**-soo; *English* **pair**-ahy **pas**-oo, **pair**-ee]

---

adverb, Latin.

1 with equal pace or progress; side by side.

2 without partiality; equably; fairly.

WHY SLEEPING NAKED COULD CUT YOUR RISK OF DIABETES

Centre and author of Sound Asleep: The Expert Guide To Sleeping Well.

'If anything prevents that decline in temperature, the brain will wake itself up to see what's going on, meaning you'll struggle to get to sleep or you'll have disturbed sleep.

'The advantage of sleeping naked is it's easier for the body to cool and maintain the lower temperature the brain wants to achieve.'

Russell Foster, professor of circadian neuroscience at the University of Oxford, says ditching nightwear may improve your slumber.

'If you're wearing lots of bedclothes it's going to be more difficult to regulate your temperature, so wear the least you can get away with.'

Disrupted sleep from being too hot doesn't just mean you'll get less sleep overall, but it might mean less deep sleep, the most restorative type.

Deep sleep is key for memory consolidation and the production of growth hormone — important for cell repair and growth.

Why does the body cool down during sleep? One theory is that it evolved to do this because our ancestors in Africa would grab some rest in the afternoon, and needed to keep cool in the savanna heat.

SWAP BED SOCKS FOR A HOT WATER BOTTLE

THOUGH it's important not to get too hot at night, make sure you have warm hands and feet.

That's because for your temperature to lower to the level that triggers sound sleep, your body needs to lose excess heat.

It does this by sending blood to the vessels near skin — in particular, those on the hands and feet — where heat is lost through the skin surface.

...not to mention ward off infections, trim your waistline

Picture: CORBIS

If you just can't go without PJs

■ CHOOSE pyjamas made from brushed cotton, says George Havenith, professor of environmental physiology and ergonomics at Loughborough University.

'The roughened surface provides a warmer feel as it holds air that insulates you.'

Natural fibres such as wool, cotton or silk 'have a good humidity buffering capacity (they absorb moisture), which will feel better in bed'.

■ COVER the torso, arms and legs. Instead of heavy quilts choose blankets, which you can remove in layers if you ge too hot. Mike Tipton, profes sor of human and applie physiology at the University Portsmouth, says: 'You wa clothing and bedding t provide insulation, but al

T2D & Sleep Disorders: Learning Objectives

- !! Double Trouble: the bidirectional association of T2D & Obstructive Sleep Apnoea/Hypopnoea Syndrome (OSAHS)

sleeping giant noun

Definition of *sleeping giant*

: one that has great but unrealized or newly emerging power

Obstructive sleep apnoea/hypopnoea syndrome and obesity hypoventilation syndrome in over 16s

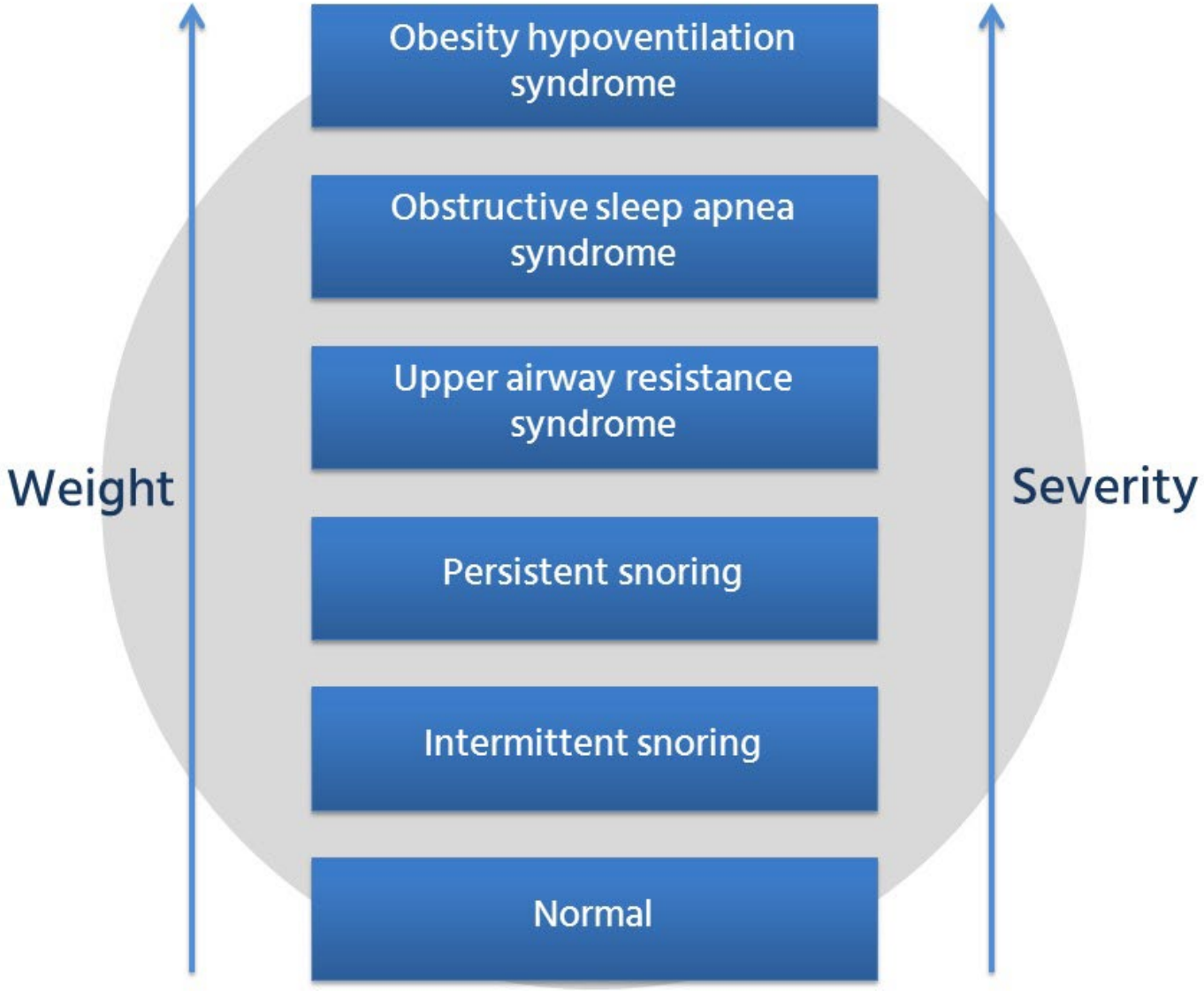
NICE guideline [NG202] Published: 20 August 2021

Guidance

Download guidance (PDF)

Next >

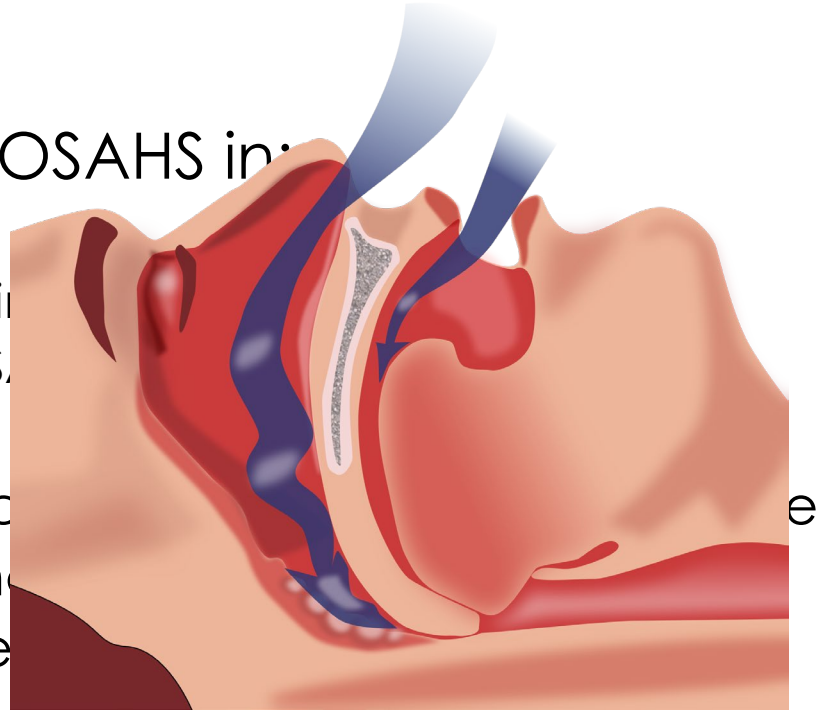
This guideline covers the diagnosis and management of obstructive sleep apnoea/hypopnoea syndrome (OSAHS), obesity hypoventilation syndrome (OHS) and chronic obstructive pulmonary disease


Obesity hypoventilation syndrome
Obstructive sleep apnea syndrome
Upper airway resistance syndrome
Persistent snoring
Intermittent snoring
Normal
Weight
Severity

- OSAHS affects around 6-13% of adults in the UK
  - At least 25% of "tired all the time" presentations have conditions such as undiagnosed OSA, sedative medications or insomnia disorders
  - If untreated, OSAHS is associated with neurocognitive impairment, adverse cardiometabolic disease & all-cause death
  - 10x more likely to have a RTA

- Upper airway repeatedly narrows or closes during sleep
  - Can lead to hypoxaemia, hypercapnia, sleep fragmentation & autonomic dysfunction

- Higher prevalence of OSAHS in:
  - T2D
    - Around 25% of people livi
    - 15-30% of people with OS
  - Obesity or overweight
  - Cardiac arrythmia partic eart failure
  - Moderate/severe asthm
  - Treatment-resistant hype



Treatment-resistant Hypertension

- Treatment-resistant hypertension is common; around 10% of all treated individuals
  - Commonest cause is primary hyperaldosteronism
    - Low K & high Na although most will be normal. Plasma ARR elevated
  - Add low-dose spironolactone if resistant hypertension (PATHWAY-2 trial)

- OSA is a common cause of treatment-resistant hypertension
  - One small study suggested 83% prevalence

A Population-Based Study of the Bidirectional Association Between Obstructive Sleep Apnea and Type 2 Diabetes in Three Prospective U.S. Cohorts

Tianyi Huang,[1,2] Brian M. Lin,[1,3] Meir J. Stampfer,[1,4] Shelley S. Tworoger,[4,5] Frank B. Hu,[1,2,4] and Susan Redline[6,7]

Diabetes Care 2018;41:2111–2119 | https://doi.org/10.2337/dc18-0675

OBJECTIVE

Multiple lines of evidence support a complex relationship between obstructive sleep apnea (OSA) and diabetes. However, no population-based study has evaluated the potential bidirectional association between these two highly prevalent disorders.

RESEARCH DESIGN AND METHODS

We followed 146,519 participants from the Nurses' Health Study (NHS; 2002–2012), Nurses' Health Study II (NHSII; 1995–2013), and Health Professionals Follow-up Study (HPFS; 1996–2012) who were free of diabetes, cardiovascular disease, and cancer at baseline. Cox proportional hazards models were used to estimate hazard ratios (HRs) for developing diabetes according to OSA status. In parallel, we used similar approaches to estimate risk of developing OSA according to diabetes status among 151,194 participants free of OSA, cardiovascular disease, and cancer at baseline. In all three cohorts, diagnoses of diabetes and OSA were identified by validated self-reports.

RESULTS

Similar results were observed across the three cohorts. In the pooled analysis, 9,029 incident diabetes cases were identified during follow-up. After accounting for potential confounders, the HR (95% CI) for diabetes was 2.06 (1.86, 2.28) comparing those with versus without OSA. The association was attenuated but remained statistically significant after further adjusting for waist circumference and BMI (HR 1.37 [95% CI 1.24, 1.53]), with the highest diabetes risk observed for OSA concomitant with sleepiness (1.78 [1.13, 2.82]). In the second analysis, we documented 9,364 incident OSA cases during follow-up. Compared with those without diabetes, the multivariable HR (95% CI) for OSA was 1.53 (1.32, 1.77) in individuals with diabetes. Adjustment for BMI and waist circumference attenuated the association (1.08 [1.00, 1.16]); however, an increased risk was observed among those with diabetes who used insulin compared with those without diabetes (1.43 [1.11, 1.83]), particularly among women (1.60 [1.34, 1.89]).

CONCLUSIONS

OSA is independently associated with an increased risk of diabetes, whereas insulin-treated diabetes is independently associated with a higher risk of OSA, particularly in women. Clinical awareness of this bidirectional association may improve prevention and treatment of both diseases. Future research aimed at elucidating the mechanisms that underlie each association may identify novel intervention targets.

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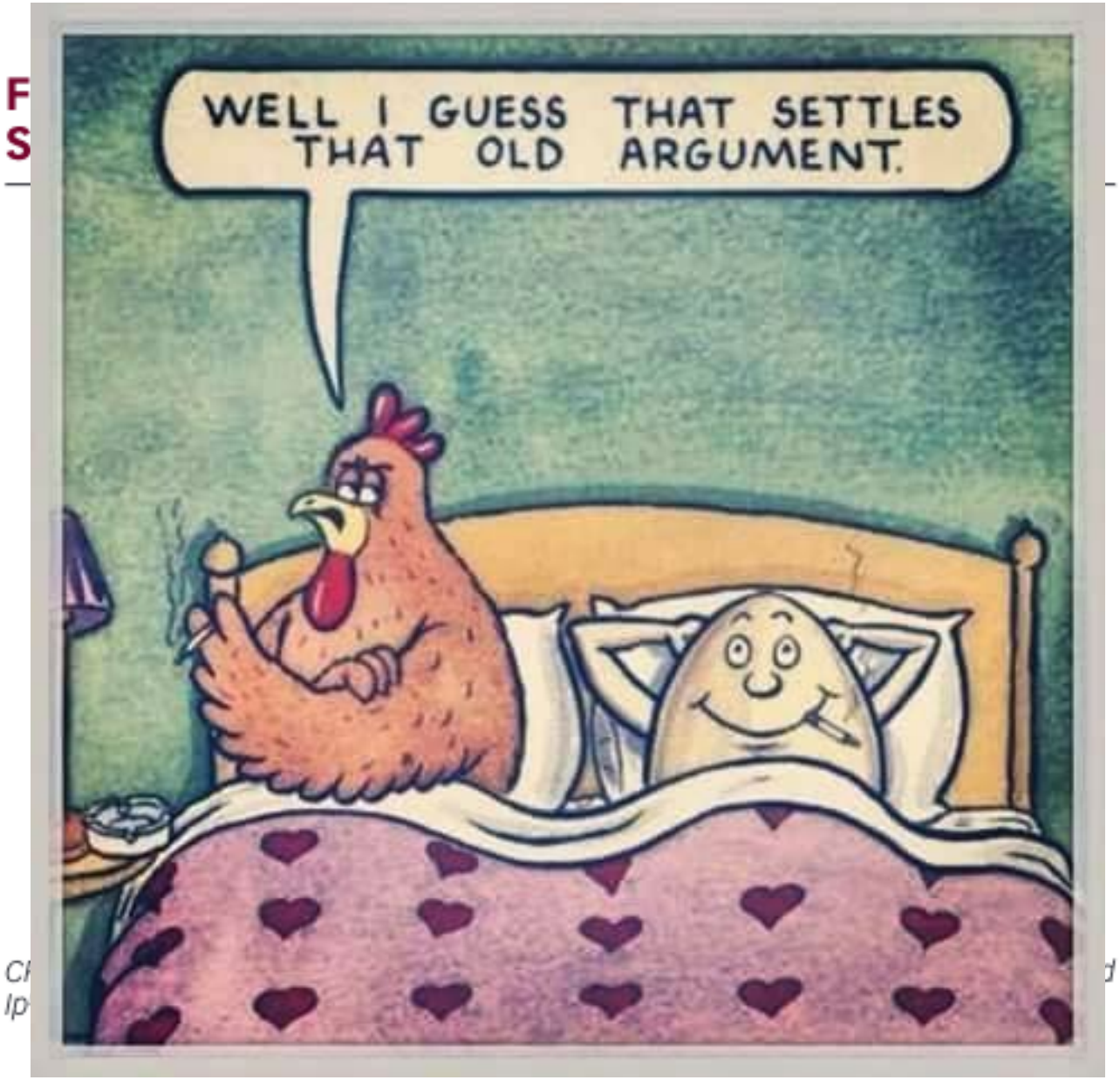


When to suspect OSAHS?

- Sleepiness is often a feature but can be associated with insomnia & sleep disruption
- Suspect OSAHS if ≥2 of:
  - Snoring
  - Witnessed apnoeas
  - Unrefreshing sleep
  - Waking headaches
  - Unexplained excessive sleepiness, tiredness, or fatigue
  - Nocturia
  - Choking during sleep
  - Cognitive dysfunction or memory impairment
- Epworth sleepiness scale is helpful to assess sleepiness rather than to diagnose OSAHS; do not use ESS alone to determine if referral needed
- Consider also using the STOP-Bang questionnaire

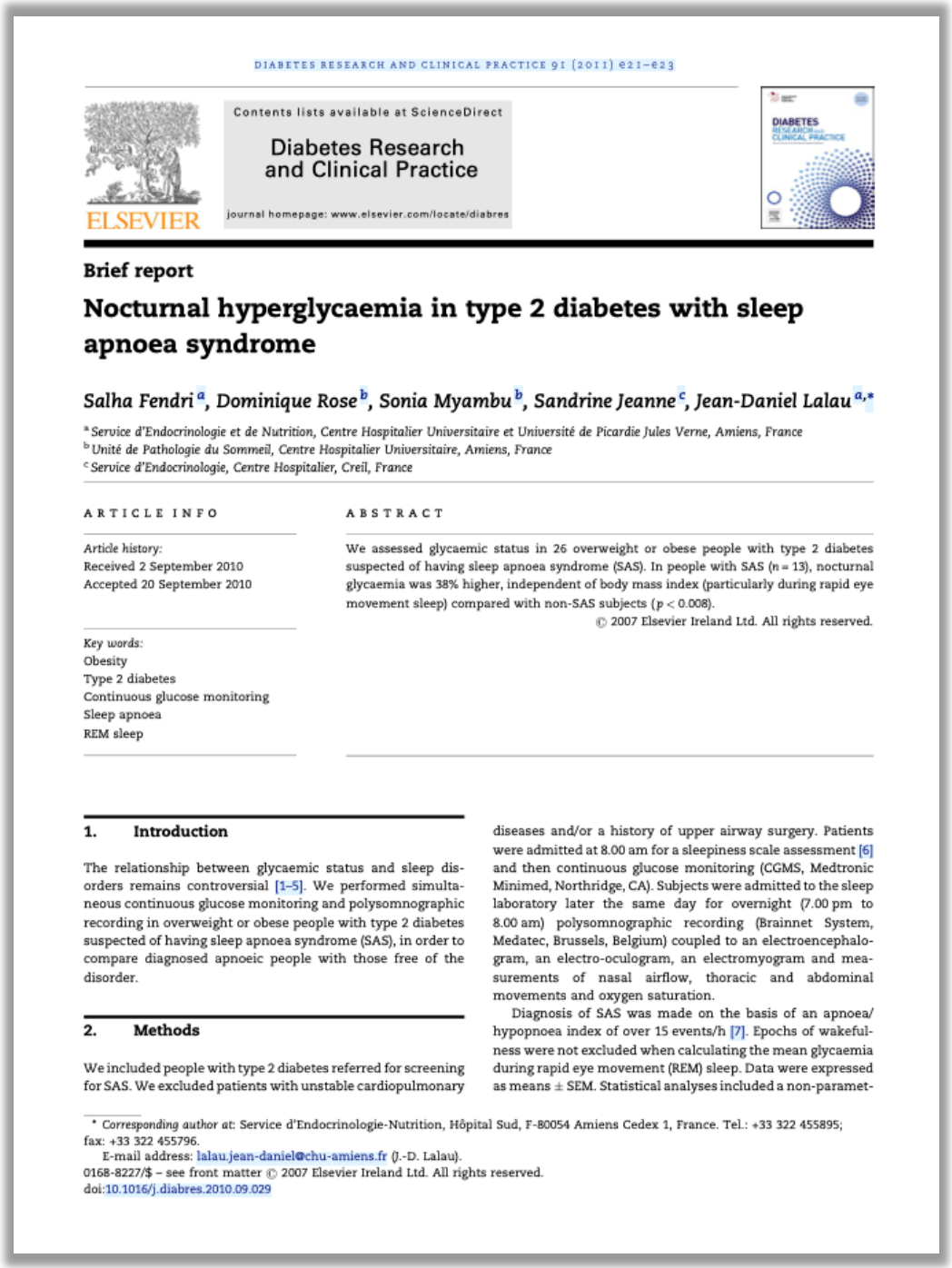
Yes	No	
		Snoring? Do you **snore loudly** (loud enough to be heard through closed doors, or your bed partner elbows you for snoring at night)?
		Tired? Do you often feel **tired, fatigued, or sleepy** during the daytime (such as falling asleep during driving or talking to someone)?
		Observed? Has anyone **observed** you **stop breathing** or **choking/gasping** during your sleep?
		Pressure? Do you have or are you being treated for **high blood pressure**?
		Body mass index more than 35 kg/m²?
		Age older than 50 years?
		Neck size large? (measured around Adam's apple) Is your shirt collar 16 inches/40 cm or larger?
		Gender=male?

For the general population:
OSA—low risk: yes to 0–2 questions
OSA—intermediate risk: yes to 3–4 questions
OSA—high risk: yes to 5–8 questions
or yes to ≥2 of 4 STOP questions + male gender
or yes to ≥2 of 4 STOP questions + BMI >35 kg/m²
or yes to ≥2 of 4 STOP questions + neck circumference 16 inches/40 cm

OSA=obstructive sleep apnoea; BMI=body mass index

Figure 1: STOP-Bang Questionnaire[10]

STOP-Bang website. *STOP-Bang Questionnaire*. **www.stopbang.ca/osa/screening.php**



DIABETES RESEARCH AND CLINICAL PRACTICE 91 (2011) e21–e23

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Diabetes Research and Clinical Practice

journal homepage: www.elsevier.com/locate/diabres

Brief report

Nocturnal hyperglycaemia in type 2 diabetes with sleep apnoea syndrome

Salha Fendri[a], *Dominique Rose*[b], *Sonia Myambu*[b], *Sandrine Jeanne*[c], *Jean-Daniel Lalau*[a,*]

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ABSTRACT

We assessed glycaemic status in 26 overweight or obese people with type 2 diabetes suspected of having sleep apnoea syndrome (SAS). In people with SAS ($n = 13$), nocturnal glycaemia was 38% higher, independent of body mass index (particularly during rapid eye movement sleep) compared with non-SAS subjects ($p < 0.008$).

1. Introduction

The relationship between glycaemic status and sleep disorders remains controversial [1–5]. We performed simultaneous continuous glucose monitoring and polysomnographic recording in overweight or obese people with type 2 diabetes suspected of having sleep apnoea syndrome (SAS), in order to compare diagnosed apnoeic people with those free of the disorder.

2. Methods

We included people with type 2 diabetes referred for screening for SAS. We excluded patients with unstable cardiopulmonary diseases and/or a history of upper airway surgery. Patients were admitted at 8.00 am for a sleepiness scale assessment [6] and then continuous glucose monitoring (CGMS, Medtronic Minimed, Northridge, CA). Subjects were admitted to the sleep laboratory later the same day for overnight (7.00 pm to 8.00 am) polysomnographic recording (Brainnet System, Medatec, Brussels, Belgium) coupled to an electroencephalogram, an electro-oculogram, an electromyogram and measurements of nasal airflow, thoracic and abdominal movements and oxygen saturation.

Diagnosis of SAS was made on the basis of an apnoea/hypopnoea index of over 15 events/h [7]. Epochs of wakefulness were not excluded when calculating the mean glycaemia during rapid eye movement (REM) sleep. Data were expressed as means ± SEM. Statistical analyses included a non-paramet-

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0168-8227/$ – see front matter
doi:10.1016/j.diabres.2010.09.029

- OSA is associated with insulin resistance & may cause worsening of nocturnal hyperglycaemia in those living with T2D & overweight or obesity

- Nocturnal glycaemia was 38% higher, independent of demographic factors (inc. BMI), in those with OSA

ORIGINAL ARTICLE

Obstructive Sleep Apnea and Retinopathy in Patients with Type 2 Diabetes

A Longitudinal Study

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Abstract

Rationale: Obstructive sleep apnea (OSA) is associated with several pathophysiological deficits found in diabetic retinopathy (DR). Hence, it's plausible that OSA could play a role in the pathogenesis of sight-threatening DR (STDR).

Objectives: To assess the relationship between OSA and DR in patients with type 2 diabetes and to assess whether OSA is associated with its progression.

Methods: A longitudinal study was conducted in diabetes clinics within two U.K. hospitals. Patients known to have any respiratory disorder (including OSA) were excluded. DR was assessed using two-field 45-degree retinal images for each eye. OSA was assessed using a home-based multichannel cardiorespiratory device.

Measurements and Main Results: A total of 230 patients were included. STDR and OSA prevalence rates were 36.1% and 63.9%, respectively. STDR prevalence was higher in patients with OSA than in those without OSA (42.9% vs. 24.1%; $P = 0.004$). After adjustment for confounders, OSA remained independently associated with STDR (odds ratio, 2.3; 95% confidence interval, 1.1–4.9; $P = 0.04$). After a median (interquartile range) follow-up of 43.0 (37.0–51.0) months, patients with OSA were more likely than patients without OSA to develop preproliferative/proliferative DR (18.4% vs. 6.1%; $P = 0.02$). After adjustment for confounders, OSA remained an independent predictor of progression to preproliferative/proliferative DR (odds ratio, 5.2; 95% CI confidence interval, 1.2–23.0; $P = 0.03$). Patients who received continuous positive airway pressure treatment were significantly less likely to develop preproliferative/proliferative DR.

Conclusions: OSA is associated with STDR in patients with type 2 diabetes. OSA is an independent predictor for the progression to preproliferative/proliferative DR. Continuous positive airway pressure treatment was associated with reduction in preproliferative/proliferative DR. Interventional studies are needed to assess the impact of OSA treatment on STDR.

Keywords: obstructive sleep apnea; diabetic retinopathy; maculopathy

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- OSA (even mild) is independently associated with maculopathy & sight-threatening retinopathy in people living with T2D
- OSA is an independent predictor of progression to pre-proliferative/proliferative DR over 4 years
- CPAP was associated with a ↓ in pre-proliferative/proliferative DR

SLEEP APNOEA TRUST

Welcome to the Sleep Apnoea Trust
Working to improve the lives of sleep apnoea patients, their partners and their families. Join our charity, donate or fundraise and help our work
• JOIN • DONATE • FUNDRAISE • RENEW MEMBERSHIP •

The DVLA, Sleepiness and Driving

If you are experiencing some sleepiness during waking hours, go to your GP, preferably with a completed Epworth score (click on **Epworth Sleepiness Scale for SATA**), and ask for a referral to a sleep clinic. If the sleep clinic diagnoses Obstructive Sleep Apnoea (OSA) but says that any sleepiness during waking hours is not excessive you can continue to drive and do not need to notify the DVLA. SATA does however suggest that if the sleepiness gets any worse you go back to your GP.

If the Sleep Clinic diagnoses moderate or severe OSA with excessive sleepiness, you must stop driving until your sleep clinic is satisfied that your CPAP or other treatment, has your sleepiness under control. You then need to notify the DVLA. The Detailed DVLA Guidance for Drivers tells you when to notify DVLA, and how to fill in the DVLA forms.

WHEN YOU NOTIFY THE DVLA WE CONTINUE TO ADVISE THAT YOU DO SO IN WRITING, RATHER THAN BY TELEPHONE OR EMAIL.

1. Keep copies of all documents and a brief record of what has taken place to back up your case if necessary.

If you have already had your driving license revoked by the DVLA, and you think this was because of a mistake on their part, or because you, your GP or your consultant or sleep clinic gave DVLA wrong advice, the detailed guidance tells you what to do, and makes it clear that it may be necessary to take the matter up with your MP.

If all reasonable steps are taken by you and your are still not permitted to drive and have your licence reinstated, then go to your MP. Part of their duty is to sort matter out, especially when two Government Departments are involved, in this case the Department of Health and the Department of Transport.

NB The information on these pages is also subject to our website Terms of Use.

The DVLA guidelines on driving and sleep apnoea are improving, with less drivers experiencing problems. More improvements are coming from the DVLA and we will let you know when they happen. The Detailed DVLA Guidance for Drivers is a comprehensive summary of the current rules as SATA understands them and it provides detailed guidance on how to fill in the forms, and how to complain if you lose your licence unnecessarily. We recognise that the document is not an easy read however, so the following is a "quick start" guide. When the DVLA makes improvements, we will update this guidance accordingly.

Driving and Sleep Apnoea – The Rules

Detailed DVLA Guidance for UK Drivers with Sleep Apnoea

Detailed Guidance for Healthcare Professionals

Email Helpline

https://sleep-apnoea-trust.org/driving-and-sleep-apnoea-the-rules/

T2D & Sleep Disorders: Learning Objectives

- Rise & shine: practicing healthy sleep hygiene

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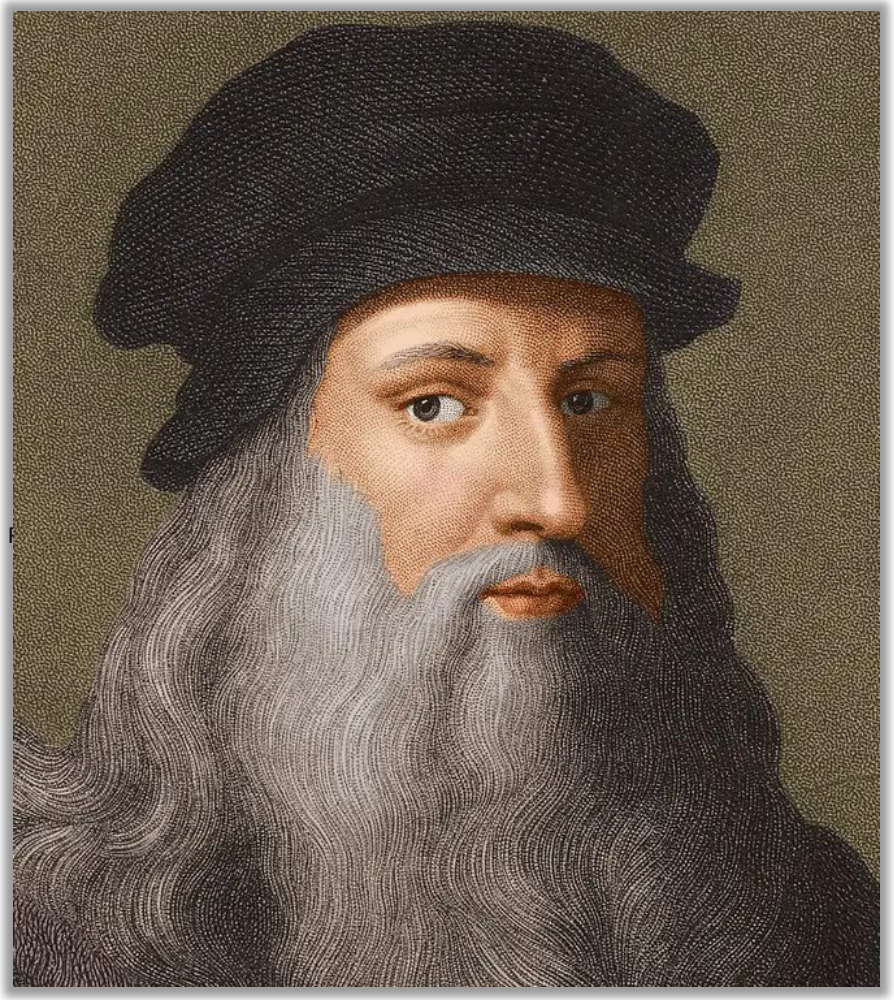
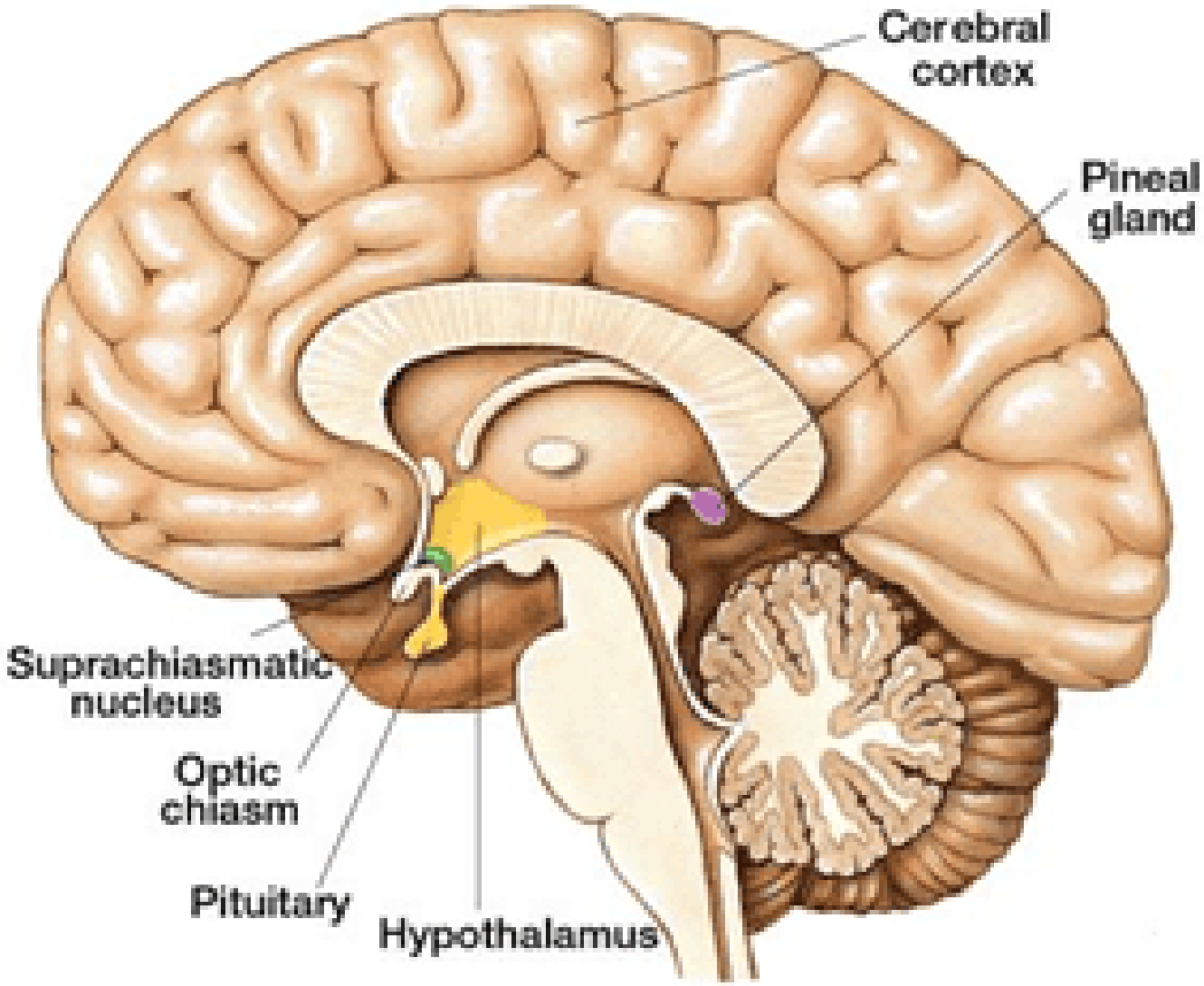
‘A well-spent day brings happy sleep’

Leonardo Da Vinci 1452-1519



Practicing Healthy Sleep Hygiene

- Regular times for going to bed & waking up, no matter how bad that night's sleep was (and no sleeping in after a poor night's sleep)
- Relaxing before going to bed
- Making the sleep environment comfortable: not too hot, cold, noisy or bright
- No napping during the day
- No caffeine, nicotine or alcohol within 6 hours of going to bed (some benefit from excluding caffeine completely)
- Exercise during the day (but not just before bed)
- No heavy meals late at night
- Keep the bedroom just for sleep & sex
- No screen time at all hours; avoid even checking the clock during the night
- Individualised, modify & compromise when necessary!


Cerebral cortex
Pineal gland
Suprachiasmatic nucleus
Optic chiasm
Pituitary
Hypothalamus

Useful Resources for Sleep Hygiene

- https://www.sleepio.com
- British Snoring & Sleep Apnoea Association https://britishsnoring.co.uk
- Sleep Apnoea Trust https://sleep-apnoea-trust.org
- Scottish Association for Sleep Apnoea https://scottishsleepapnoea.co.uk
- The Sleep Charity https://thesleepcharity.org.uk

McKayla

Age	4
History	Restless and snores loudly through the night. Irritable & hyperactive during the day
PMH	Nil
Weight	90th centile
Examination	Alert, feral Normal facies Ears nad, turbinates a wee bit swollen Throat – large tonsils not infected or inflamed
Social history	Only child, attends nursery, no concerns about developmental milestones

What is the likely underlying diagnosis?

1. Simple snoring
2. Allergic rhinitis
3. Obstructive sleep apnoea
4. Laryngeal hypertrophy
5. Attention-Deficit/Hyperactivity Disorder (ADHD)

What is your next step?

1. Refer paediatric dietitian
2. Refer paediatric ENT
3. Refer CAMHS
4. Reassure parents
5. Trial intranasal steroids
6. Ask parents to spell her name properly

Obstructive Sleep Apnoea in Children

BMJ "10-minute Consultation" 2017 & BJGP "Clinical Intelligence" 2017

- Affects 1-4% of children and can lead to RVH, cor pulmonale & systemic hypertension if untreated

- Presentation of paediatric OSA is different to OSA in adults
  - More likely to present with behavioural problems, poor attention and reduced academic performance rather than daytime sleepiness
  - **Symptoms can mimic ADHD (25% of OSA) or poor school performance**

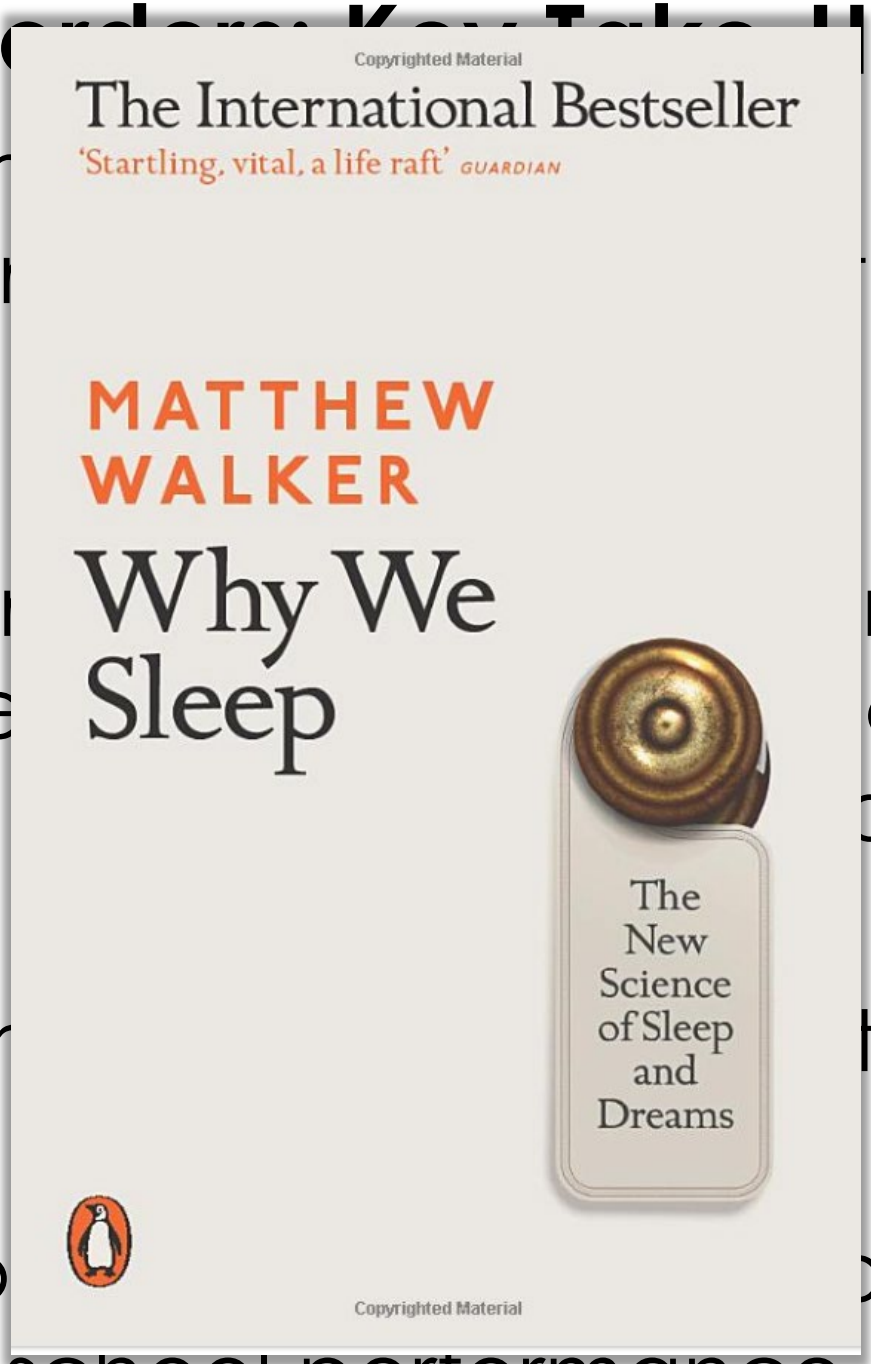
T2D & Sleep Disorders: Key Take-Home Messages

i. Sleep is a major r… asking about sleep quality & duration… to the diabetes consultation

ii. OSAHS is a sleepi… n in those with T2D but remains unde… ciated with cardiometabolic … death

iii. Sleep hygiene is r… time buzzword

iv. Paediatric OSA p… onsider if symptoms of ADHD or poor school performance



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‘Working hard for something we don’t care about is called stress. Working hard for something we love is called passion’

Simon Sinek

Thank you for listening & please get in touch if you have any questions

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 Kevin Fernando