

LINEE GUIDA NELLA TERAPIA DEL DIABETE

OGNI PAZIENTE E' DIVERSO

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Diapositiva preparata da STEFANO DEL PRATO e ceduta alla Società Italiana di Diabetologia.
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Presenter Disclosures

Research support -

AstraZeneca, Boehringer Ingelheim

Advisory board -

Abbott, Altimimmune, Amarin Corporation, Applied Therapeutics, AstraZeneca, Biomea Fusion, Eli Lilly & Co., Eva Pharma, Menarini International, Novo Nordisk, Sanofi, Sun Pharma

Speaking Engagements -

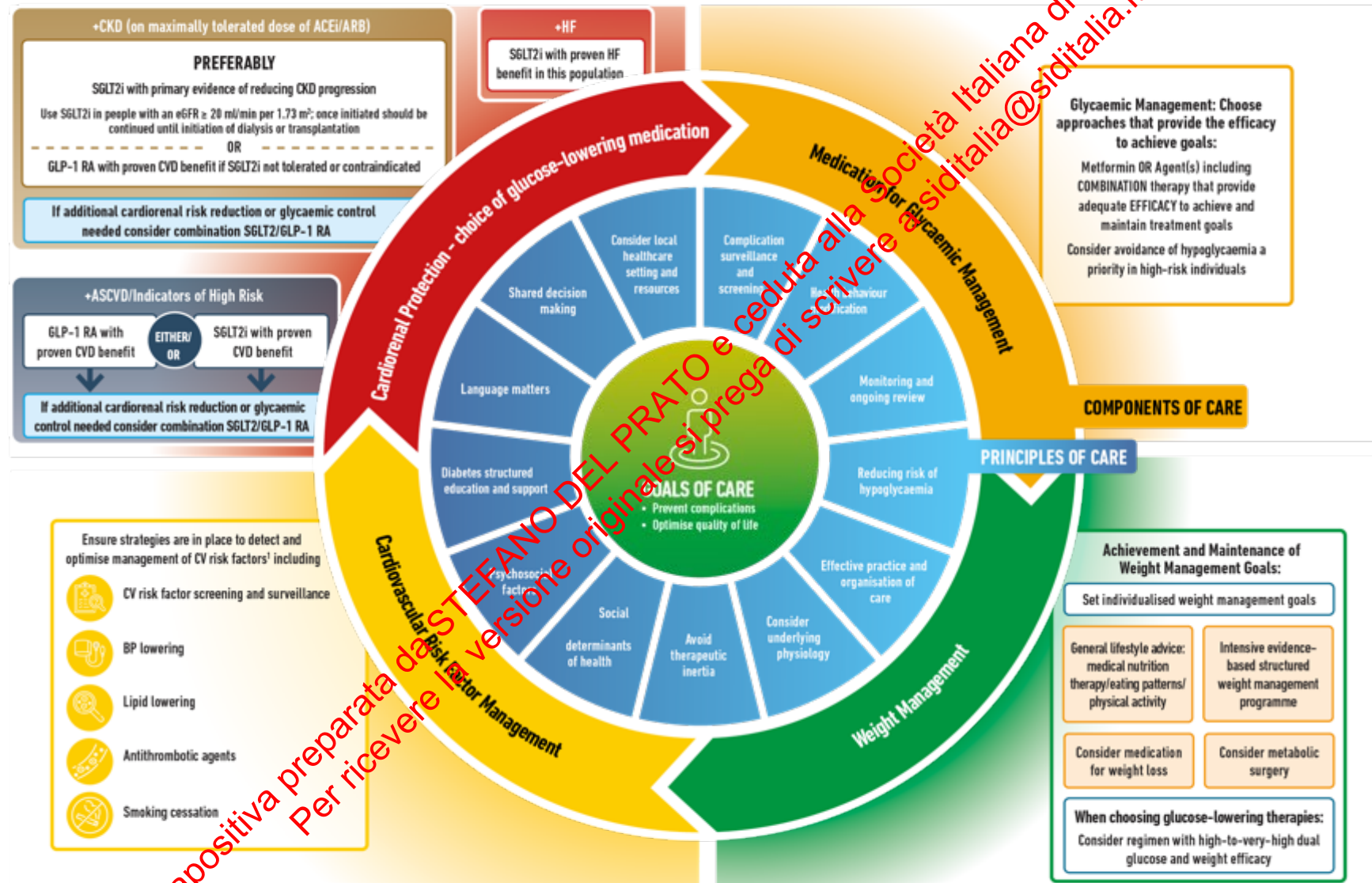
Abbott, AstraZeneca, Boehringer Ingelheim, Eli Lilly & Co., Laboratori Guidotti, Menarini International, Merck Sharpe & Dohme, Novo Nordisk, Sanofi

Institutional roles -

Past-President EASD/EFSD
President European Diabetes Forum

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ADA/EASD Consensus Report 2022



Key points to emphasise

Informed by evidence generated in the past 3 years

Greater focus on social determinants of health and systems and equality of care

Emphasis on holistic person-centred care

Greater focus on weight goals as an essential component of comprehensive care

Consolidation of evidence from CVOTs

Current State of EASD Guidelines and Statements

Guidelines and Statements:

The management of type 1 diabetes in adults. A consensus report by the American Diabetes Association (ADA) and the European Association for the Study of Diabetes (EASD) (2021)

Definition and Interpretation of Remission in Type 1 Diabetes - Consensus report by the Endocrine Society, the European Association for the Study of Diabetes (EASD), Diabetes UK and the American Diabetes Association (ADA) (2021)

Glucose Management for Exercise using Continuous Glucose Monitoring (CGM) and Intermittently Scanned CGM (isCGM) Systems in Type 1 Diabetes – Position Statement of the European Association for the Study of Diabetes (EASD) and of the International Society for Pediatric and Adolescent Diabetes (ISPAD) endorsed by the American Diabetes Association (ADA) (2021)

Precision medicine in diabetes

Diabetes X

- Most documents are consensus reports or statements
- They are often produced jointly with other organizations (e.g., ESC, EASL)
- However, their development process mostly does not follow methodology requested by reimbursement authorities (GRADE)

ADA/EASD/IDF Recommendations for Clinicians and People with Diabetes Concerning the Use of Incretin Therapy and Pancreatic Disease (2013)

Medical Devices in Diabetes Care: A statement on behalf of the European Association for the Study of Diabetes (2013)

New WHO criteria on use of Glycated Haemoglobin (HbA1c) in the Diagnosis of Diabetes Mellitus (2011)

Cardiovascular disease and diabetes in people with severe mental illness position statement from the European Psychiatric Association (EPA), supported by the European Association for the Study of Diabetes (EASD) and the European Society of Cardiology (ESC) (2009)

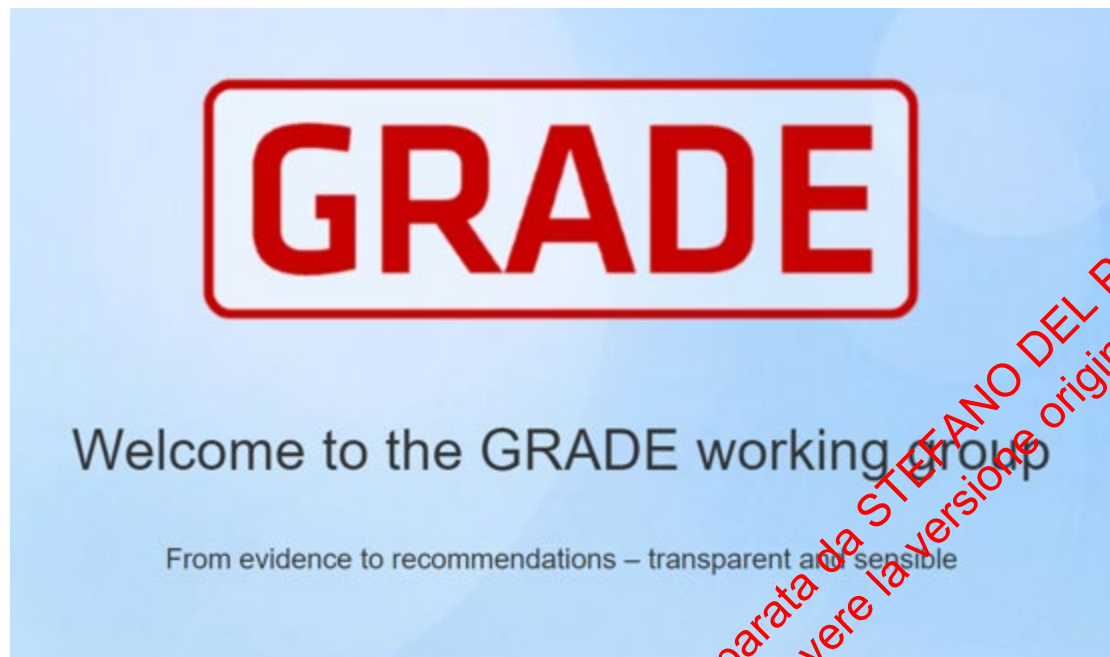
EASD Guidelines

Produce high-quality and trustworthy guideline documents:

- Focused on **patient important outcomes** and **clinically relevant topics**
- Based on a systematic review of best available evidence
- Developed by a **multidisciplinary** panel including **diabetes experts** and **methodologists**
- Following a **transparent process** adhering to **GRADE methodology**

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GRADE Methodology for Guideline Development



“GRADE: the *most accepted standard for guideline development*.

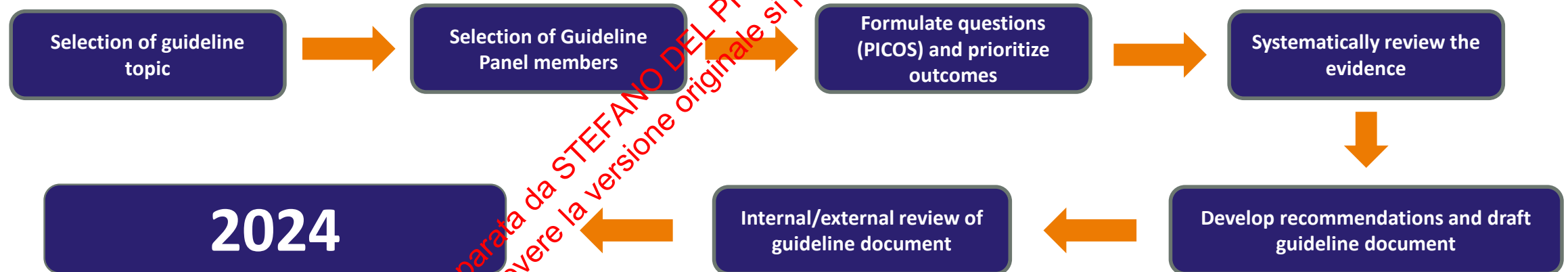
Prominent organizations using GRADE include:

- *US Agency for Healthcare Research and Quality,*
- *US Centers for Disease Control and Prevention,*
- *England’s National Institute for Health and Care Excellence (NICE),*
- *World Health Organization”*

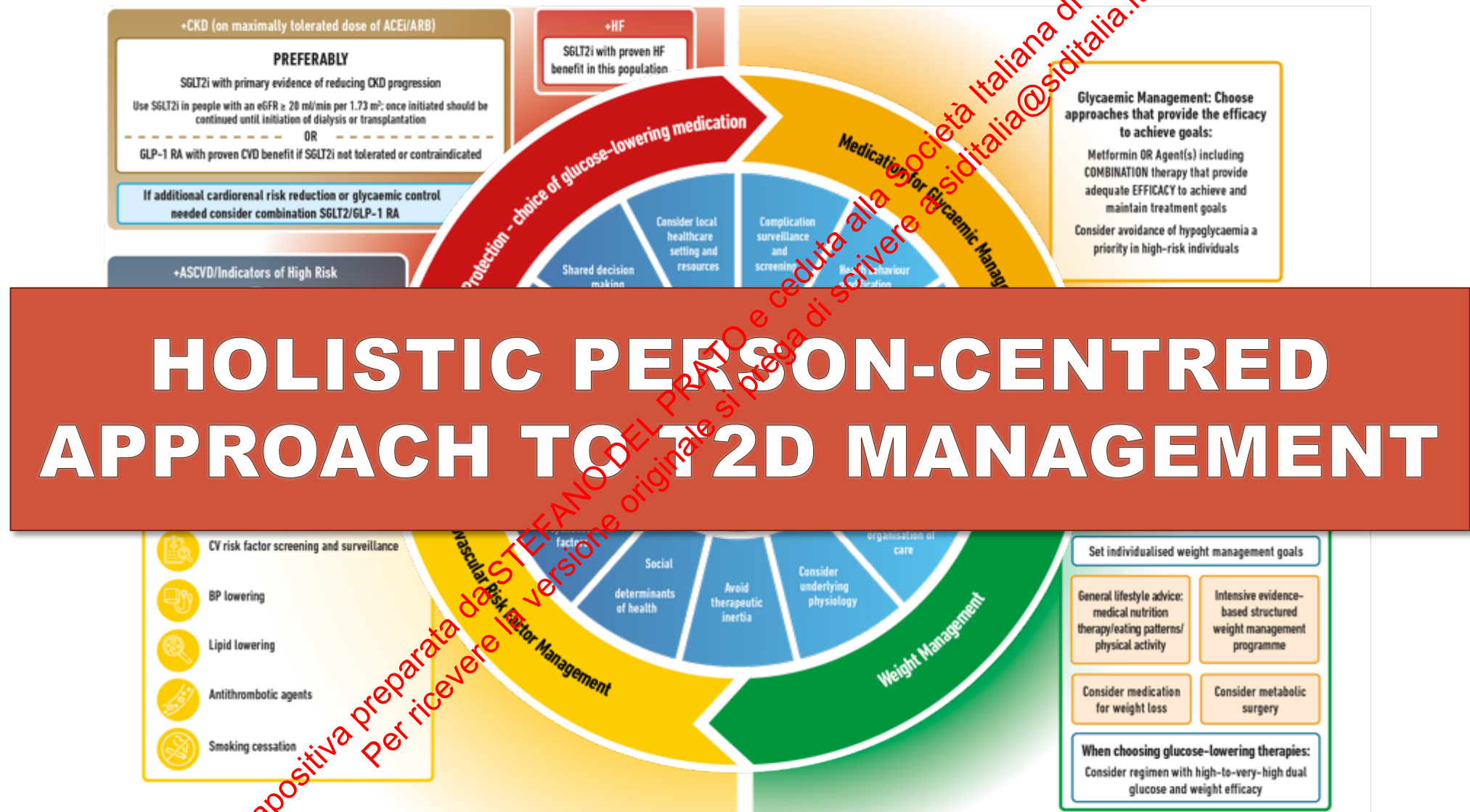
EASD Guidelines - Exerting Meaningful Clinical Impact

EASD guidelines Oversight Committee

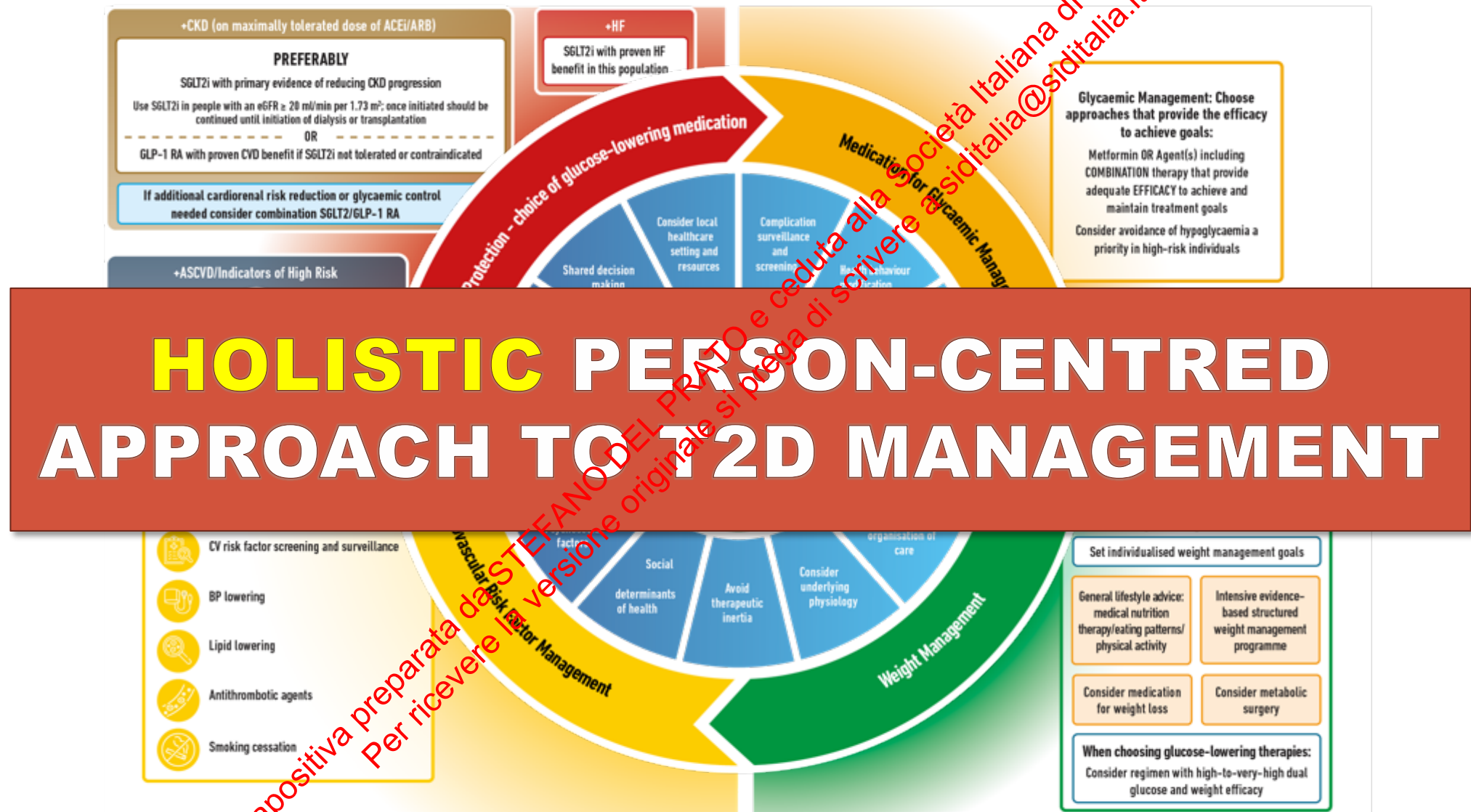
Multidisciplinary and geography/gender-balanced composition, aiming for collective and personal minimal conflicts of interests



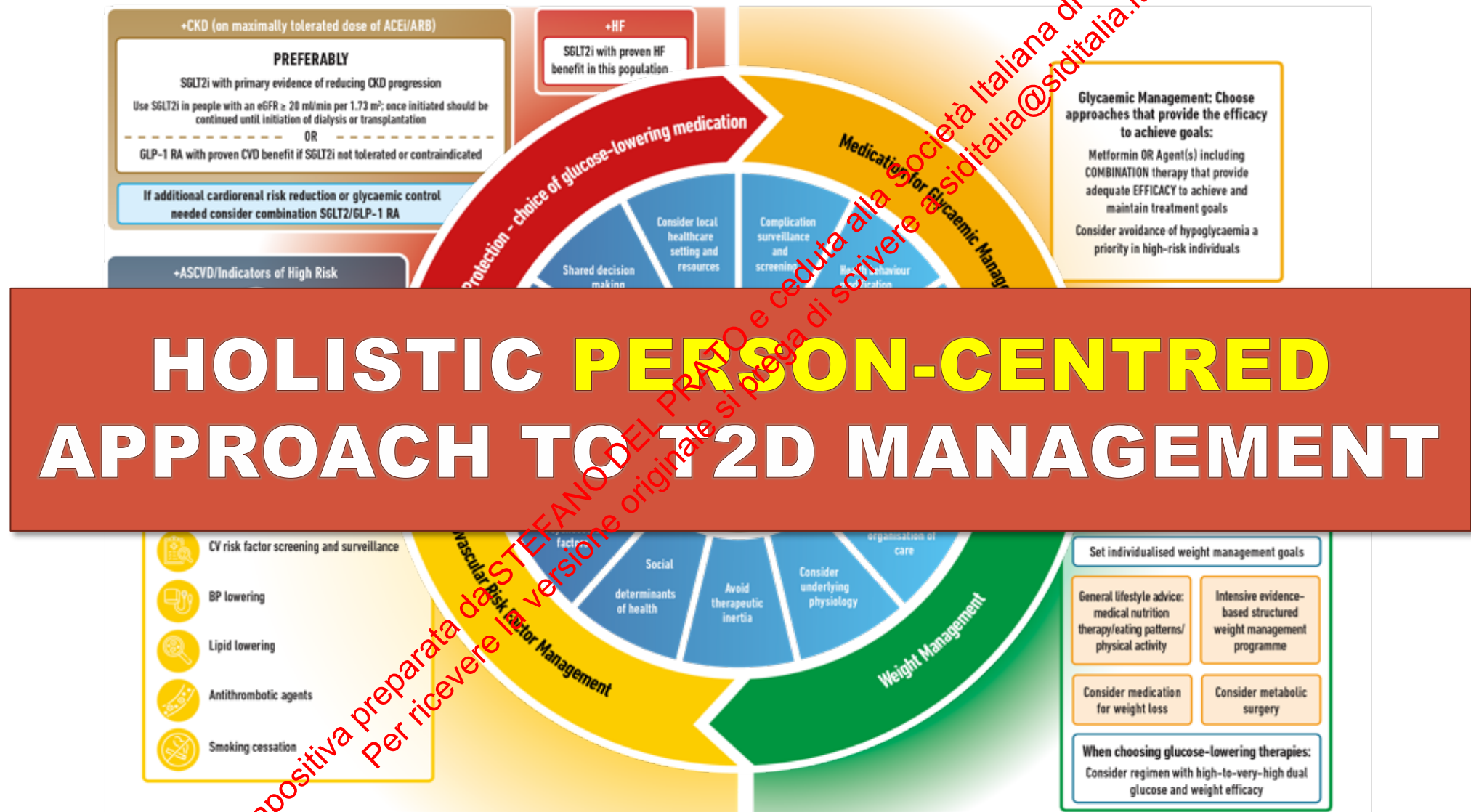
ADA/EASD Consensus Report 2022



ADA/EASD Consensus Report 2022



ADA/EASD Consensus Report 2022

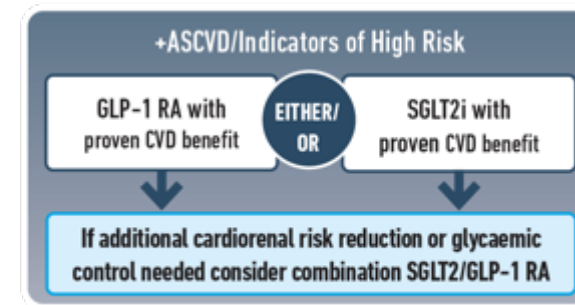
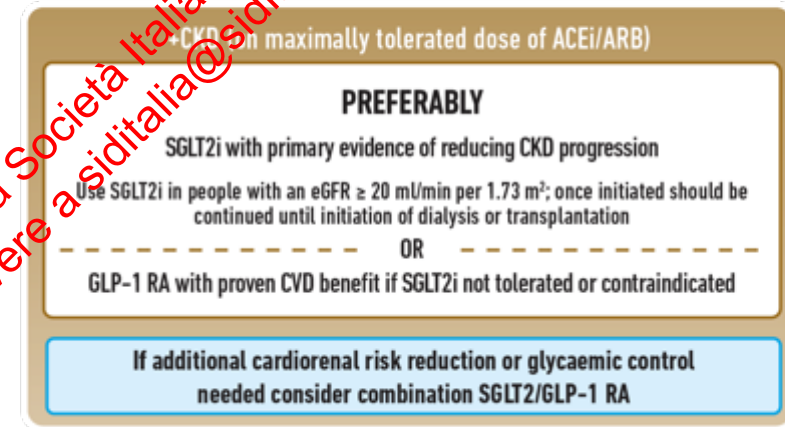


Limitations of Guideline-driven Care

- **Generalizability of clinical evidence**

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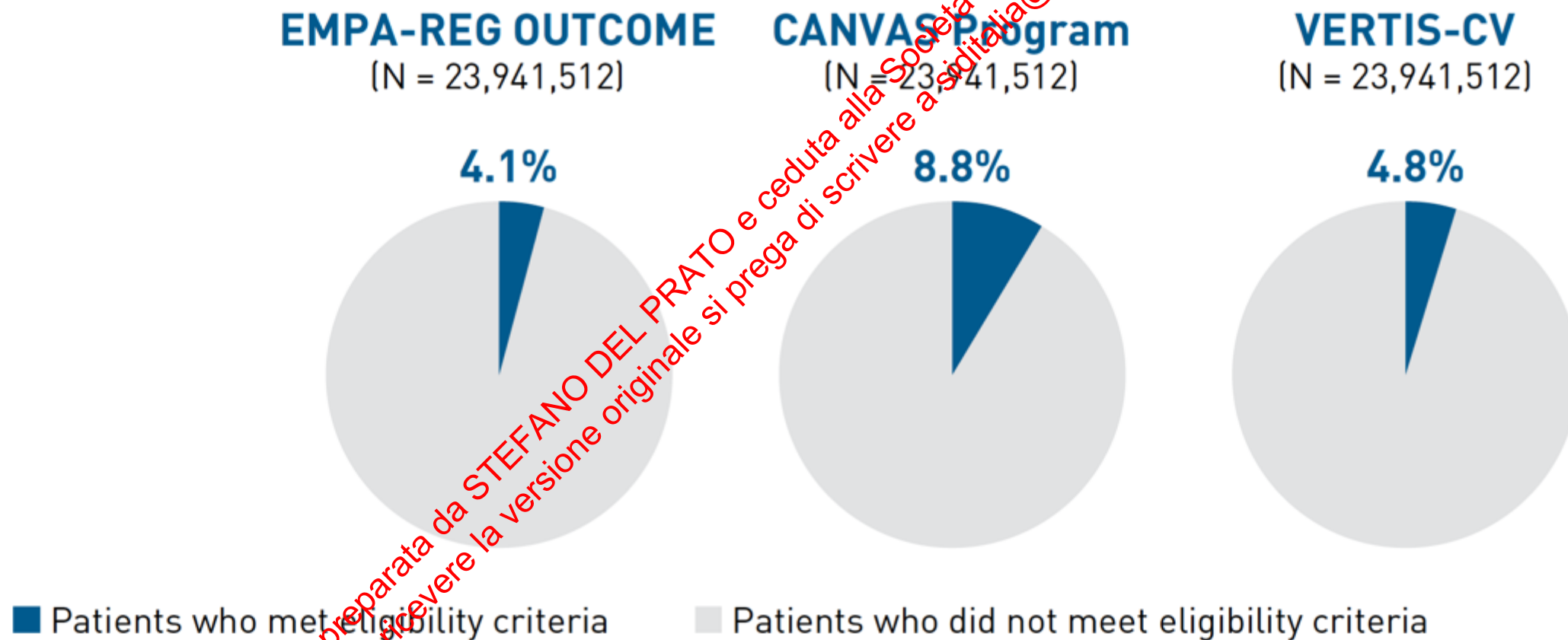
ADA-EASD 2022 Consensus on Treatment of T2DM



1 = American Diabetes Association Professional Practice Committee. 10. Cardiovascular Disease and Risk Management: Standards of Medical Care in Diabetes-2022. Diabetes Care. 2022 Jan 1;45(Suppl 1):S144-74.

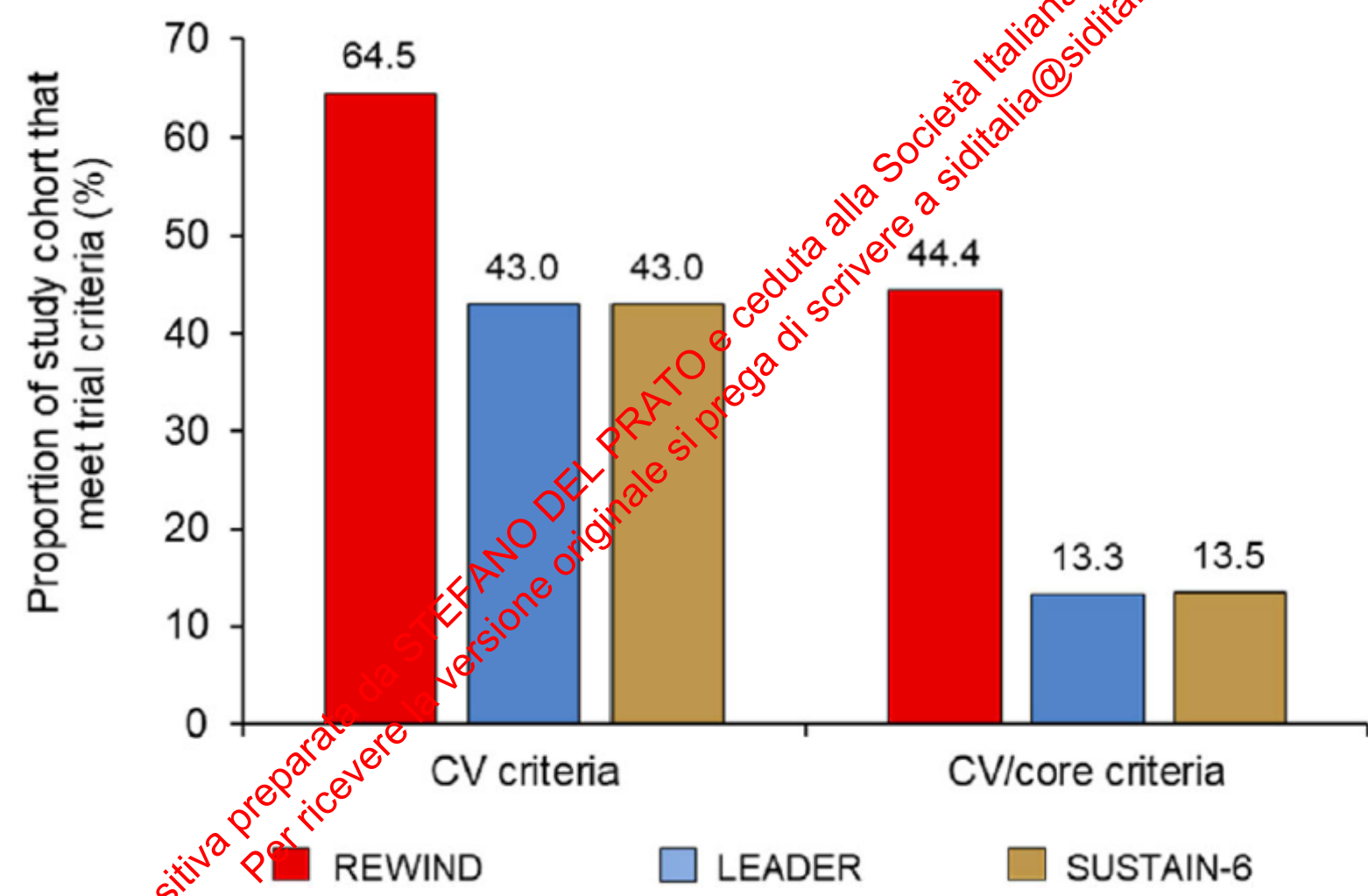
ACEi, Angiotensin-Converting Enzyme Inhibitor; ARB, Angiotensin Receptor Blockers; ASCVD, Atherosclerotic Cardiovascular Disease; BP, Blood Pressure; CKD, Chronic Kidney Disease; CV, Cardiovascular; eGFR, Estimated Glomerular Filtration Rate; GLP-1 RA, Glucagon-Like Peptide-1 Receptor Agonist; HF, Heart Failure; SGLT2i, Sodium-Glucose Cotransporter-2 Inhibitor; T2D, Type 2 Diabetes.

Percentages of Adults with T2DM Meeting Inclusion Criteria for CVOTs for SGLT2-inhibitors



Data were derived from weighted analyses of a dataset of patients with type 2 diabetes derived from the National Health and Nutrition Examination Survey.

Generalizability of GLP1RAs CVOTs to the Real-world T2DM Population in UK



Core eligibility criteria included age, HbA1c levels, eGFR, BMI, and prior medication use.

ADA/EASD Consensus Report - Key Knowledge Gaps

- **Study conduct**

- Greater attention to subgroups, in particular vulnerable populations
 - Youth, frailty, >75 years of age
 - Gender balance
- A minimal first step to enhancing health justice

- **Weight management**

- Comparative effectiveness

- **Cardiorenal protection**

- Comparative effectiveness, Combination therapy, Cost effectiveness in low/moderate risk population

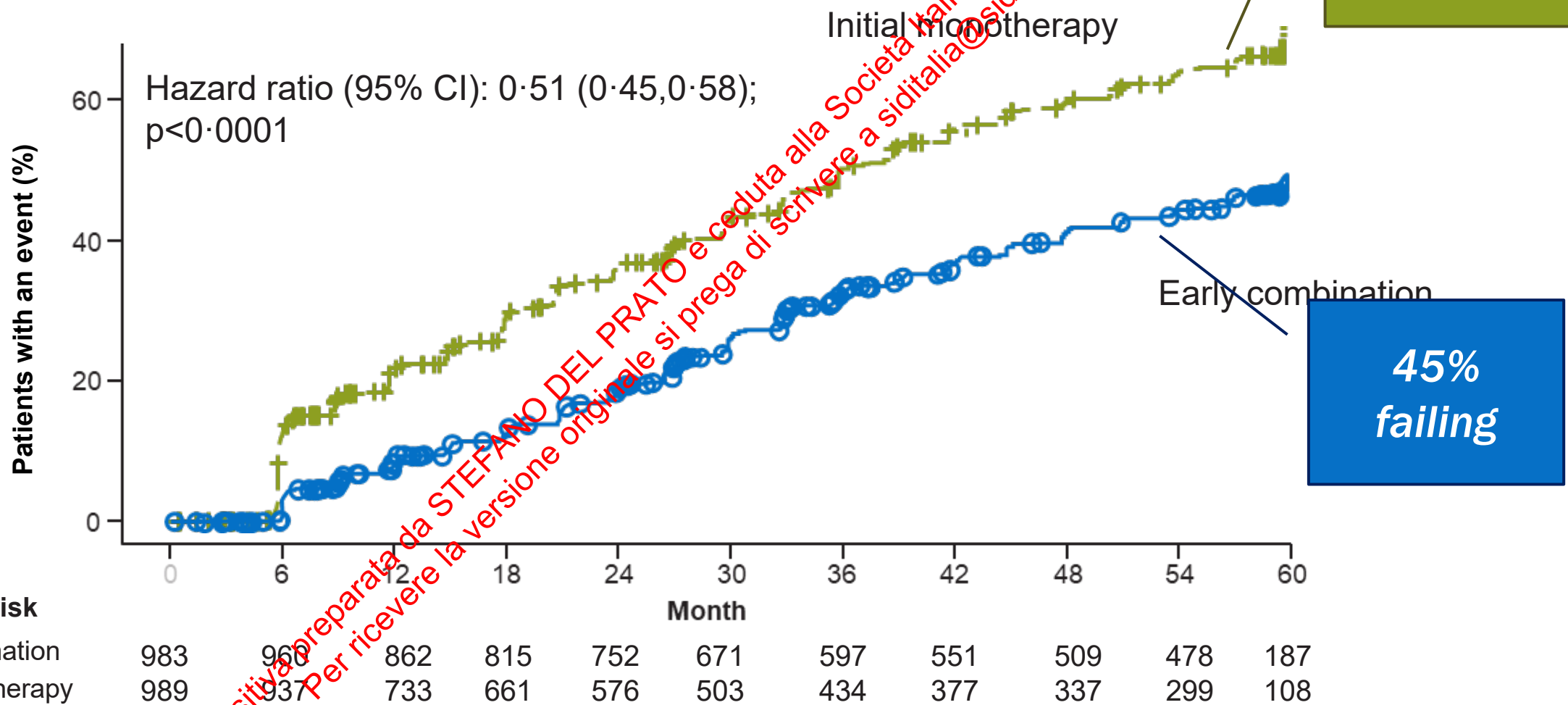
- **Targets: A1c, TIR, weight, remission**

RCT Patients vs Patients in the Real World

- **Patients may benefit from**
 - more frequent face-to-face visits
 - convenient access to therapy
 - closer monitoring
 - wider availability of educational resources
- **Trial participants are often more concerned with their health and more motivated**
- **Committing to a protocol may make it easier for patients to follow medication instructions appropriately**

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VERIFY - Time to Initial Treatment Failure



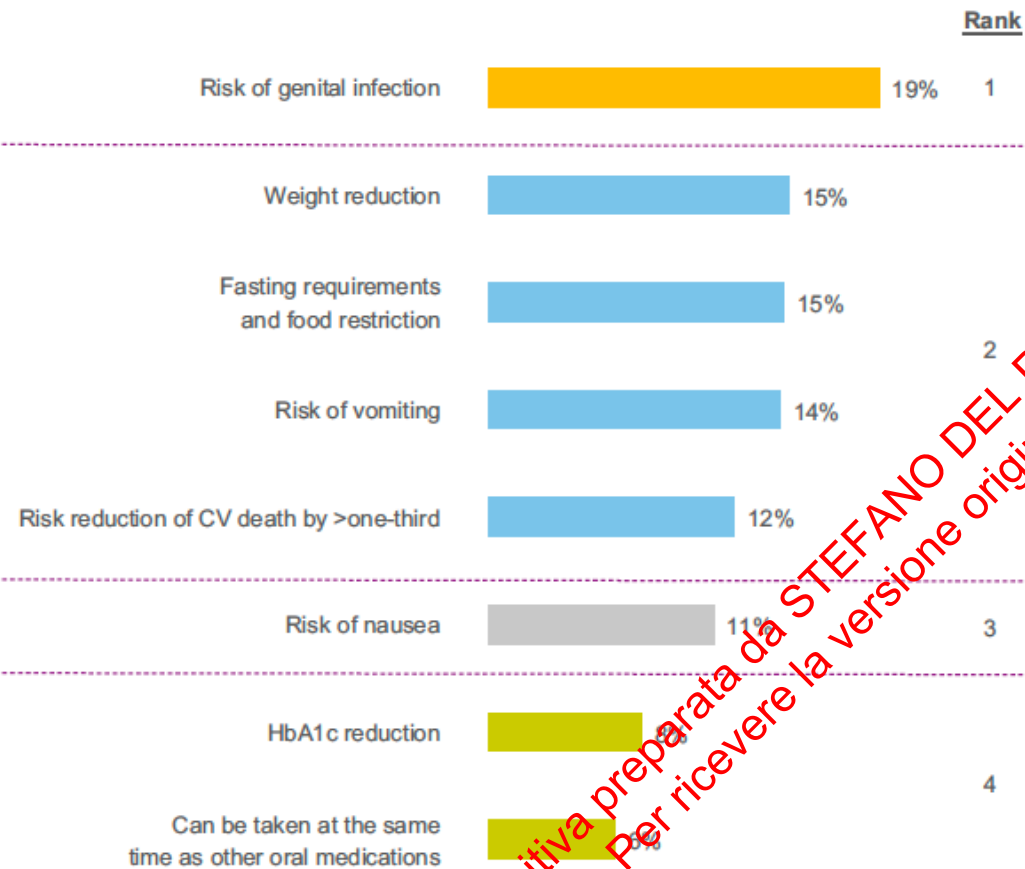
Limitations of Guideline-driven Care

- Generalizability of clinical evidence

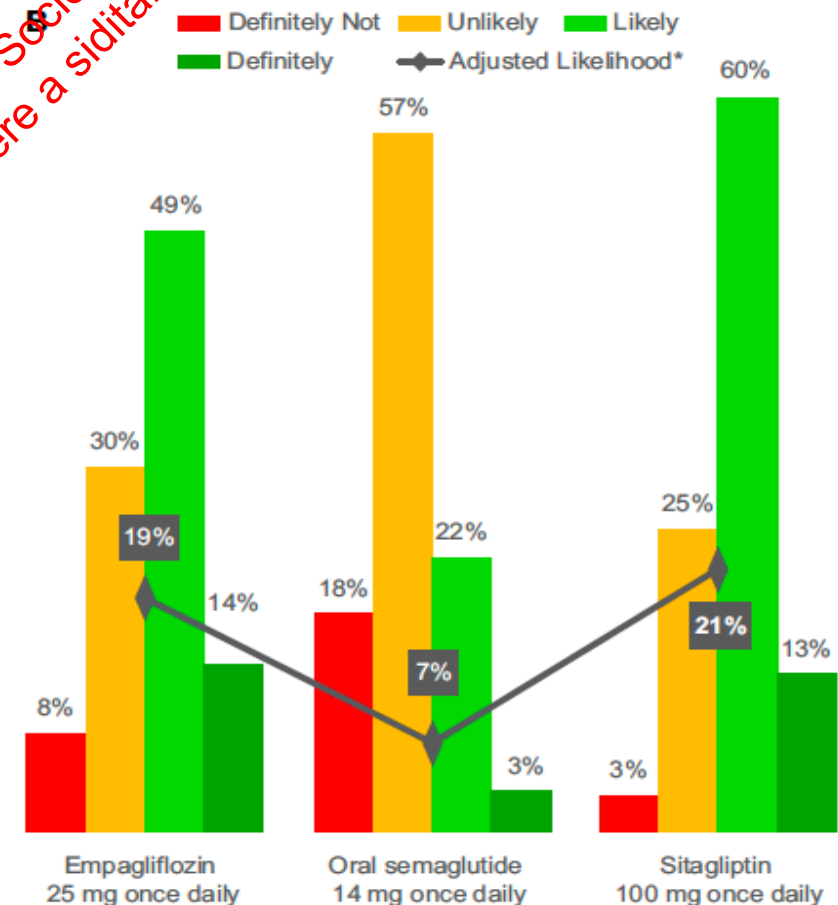
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Patient Preferences for Oral Therapies in Type 2 Diabetes

Attribute importance



Likelihood of taking empagliflozin, oral semaglutide, and sitagliptin



Social Determinants of Health

Davies MJ, Aroda VR, Collins BS, Gabbay RA, Green J, Maruthur NM, Rosas SE, Del Prato S, Mathieu C, Mingrone G, Rossing P, Tankova T, Tsapas A, Buse JB. *Diabetes Care* 2022; 45:2753-2786
Diabetologia 2022; 65:1925-1966



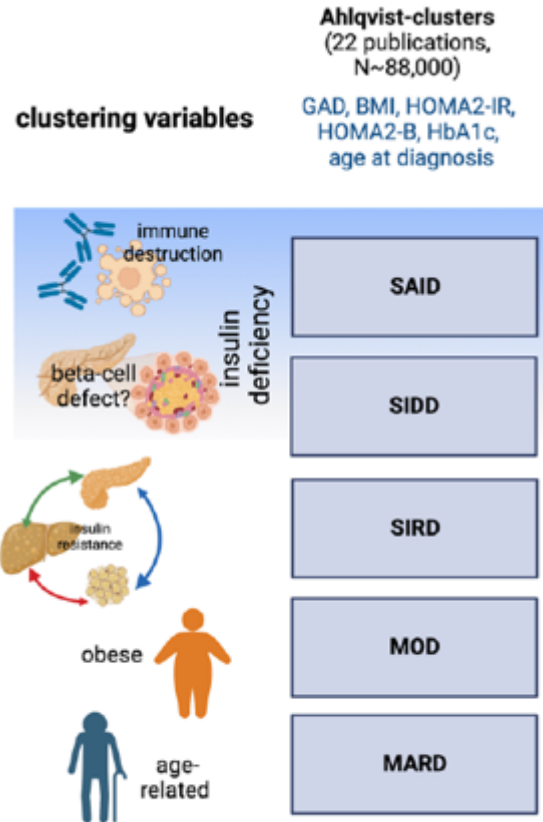
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Limitations of Guideline-driven Care

- **Generalizability of clinical evidence**
- **Patient preferences**

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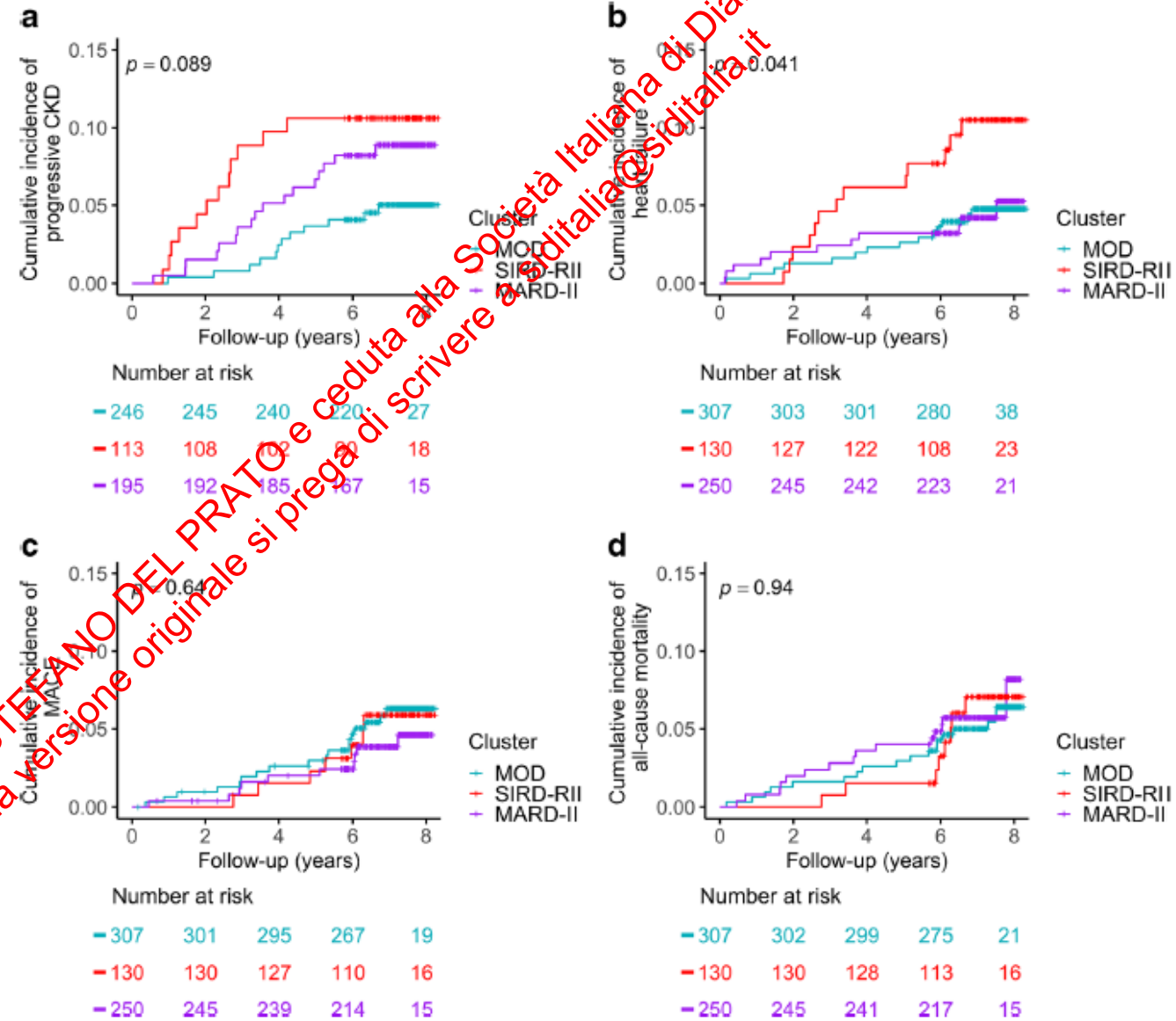
Clusters May Change Based on Clustering Variables



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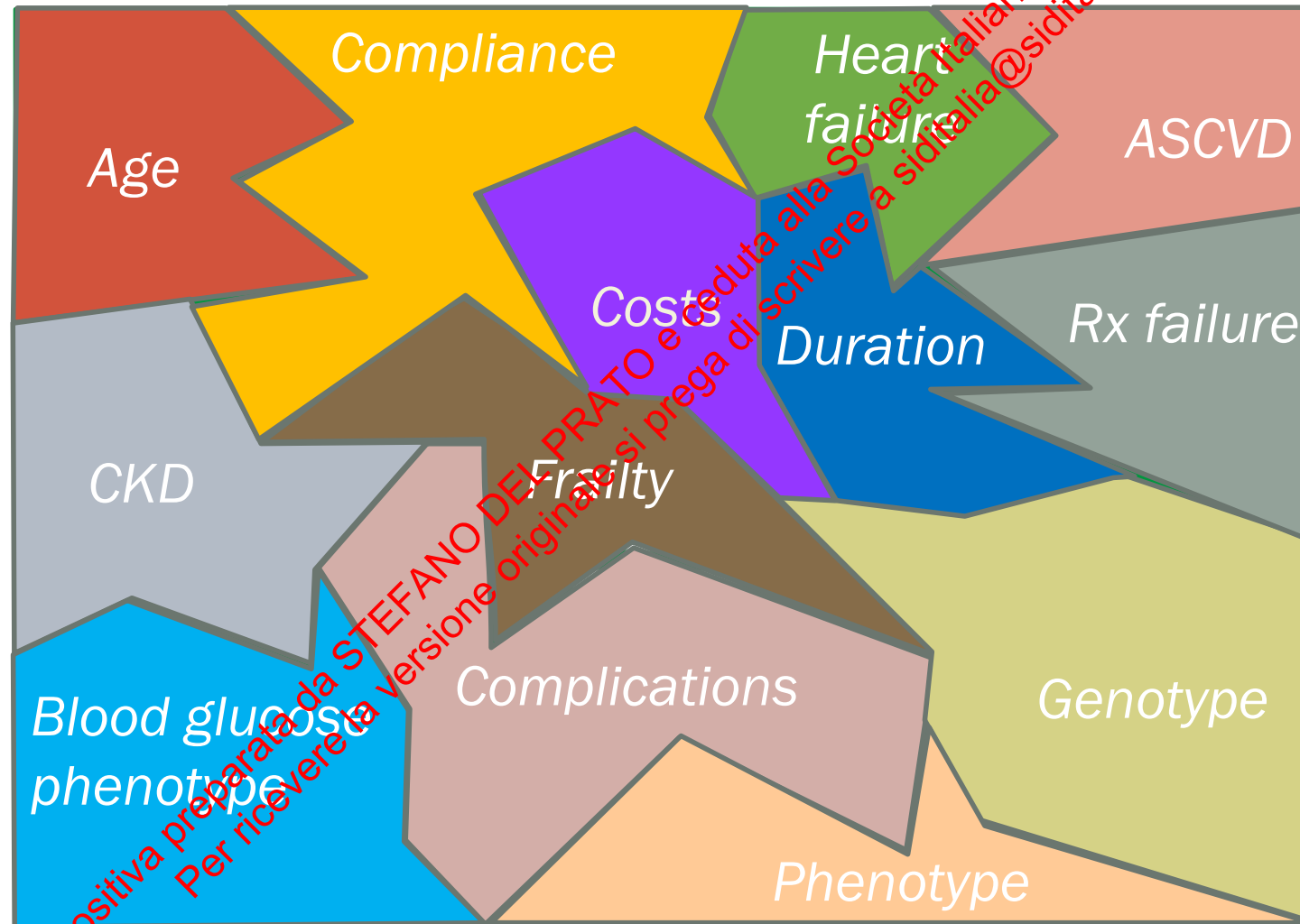
Clinical Variable-based Cluster Analysis Identifies Subgroups with Distinct Cardio- renal Risks

Wang J et al. *Diabetologia*
2022;65:2146–2156

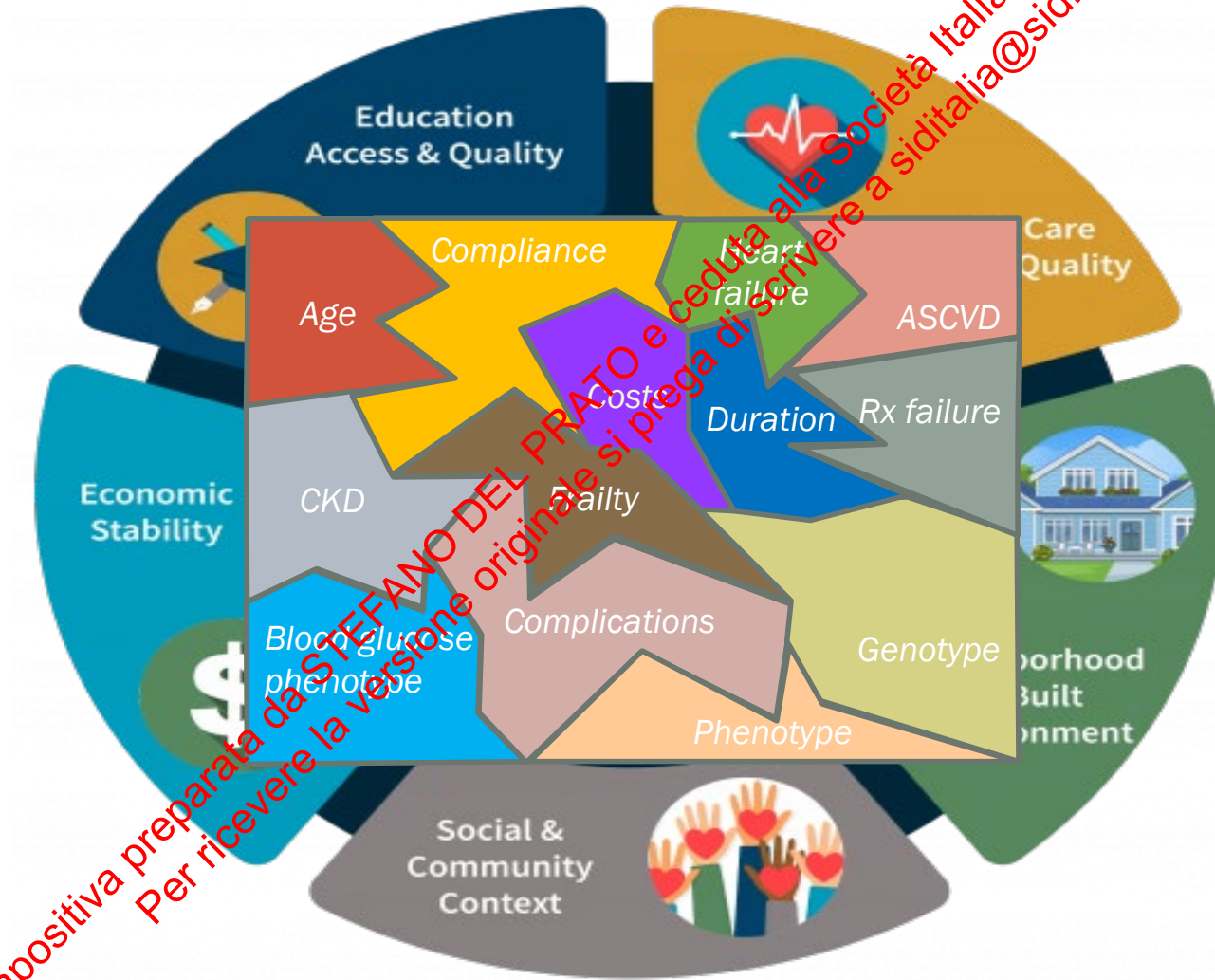


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Solving the Equation for Personalized Treatment of Type 2 Diabetes



Solving the Equation for Personalized Treatment of Type 2 Diabetes



Production of Clinical Practice Guidelines

DOCTOR



EASD

EASO

KDIGO

SID/AMD

ESC

ADA

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Deep Phenotyping and Artificial Intelligence for Health Promotion and Chronic Disease Prevention



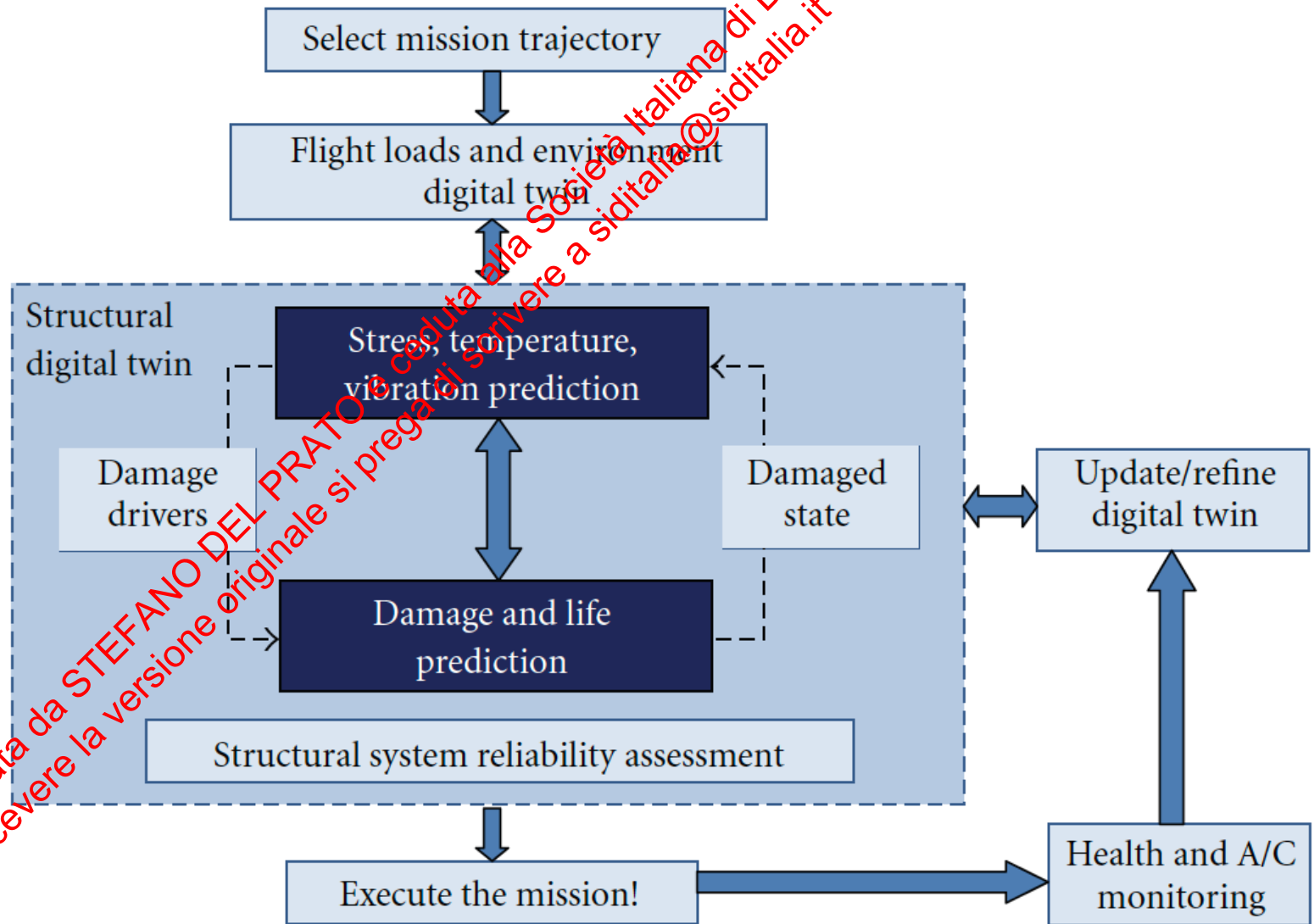


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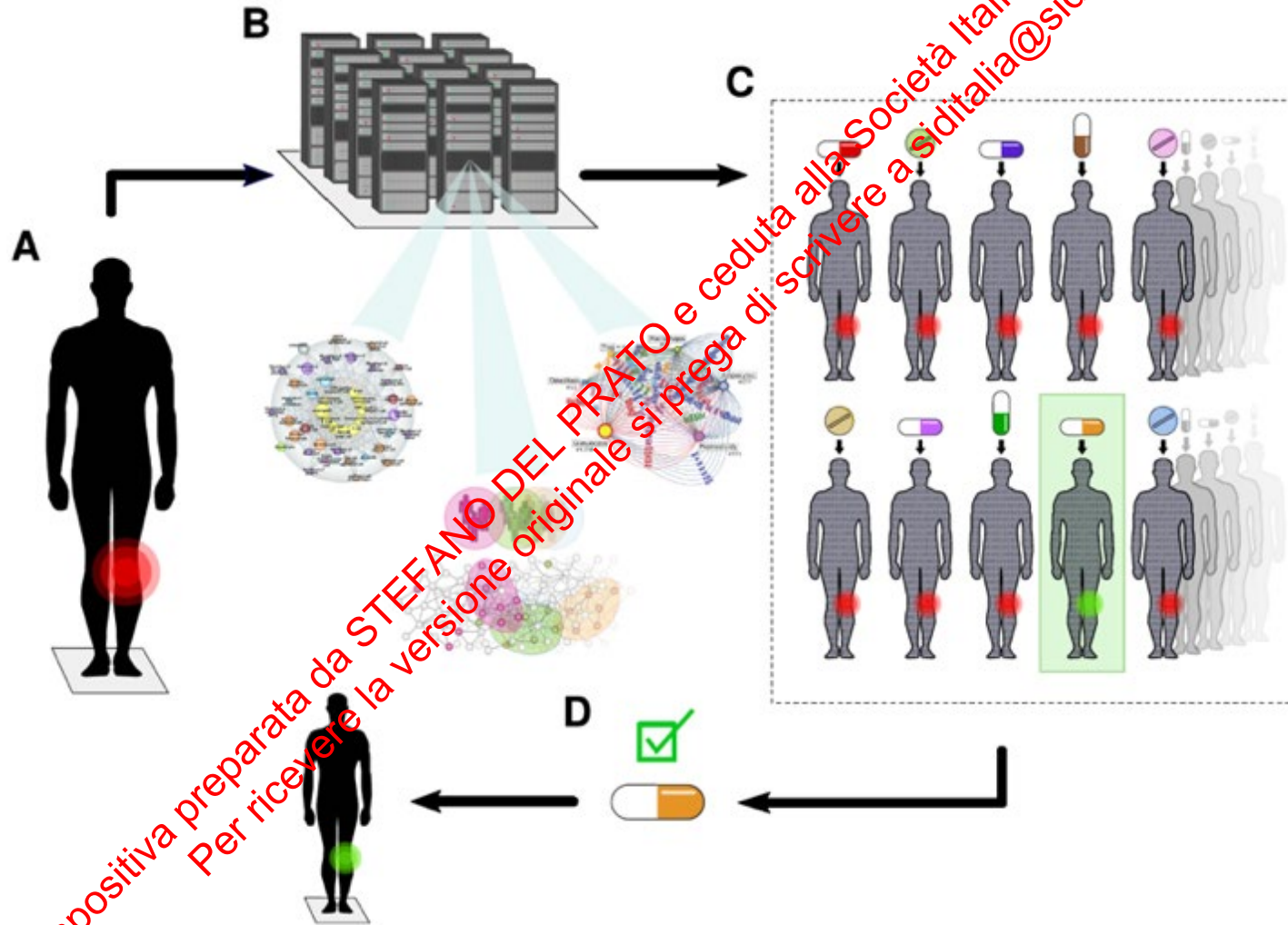
An Integrated Digital Health Care Platform for Diabetes Management with AI-Based Dietary Management: 48-Week Results From a Randomized Controlled Trial



Digital Twin: From Preserving Aircraft Structural Life....



The Digital Twin Concept for Personalized Medicine



Whole Body Digital Twin™

Reduce Medication, Lose Weight, and **Reverse**
Type 2 Diabetes



"In total, nearly 94% of the group who followed their digital twin's guidance for six months were determined to be in remission by the end of that period, per the ADA's standards—meaning they maintained normal blood glucose levels for at least three months without taking diabetes medication."
— American Diabetes Association (ADA)*

The Whole Body Digital Twin™ is a digital representation of your unique metabolism and delivers precise, personalized guidance about foods, sleep, activity, and breathing through the easy-to-use app.

Twin Health's program combines the Whole Body Digital Twin™ with a dedicated care team that monitors your sensor data, offers personalized recommendations, and supports you on your health journey.

*Artificial Intelligence Offers Significant Rate of Remission for Type 2 Diabetes Compared to Standard Care.
American Diabetes Association (2022, June 4).

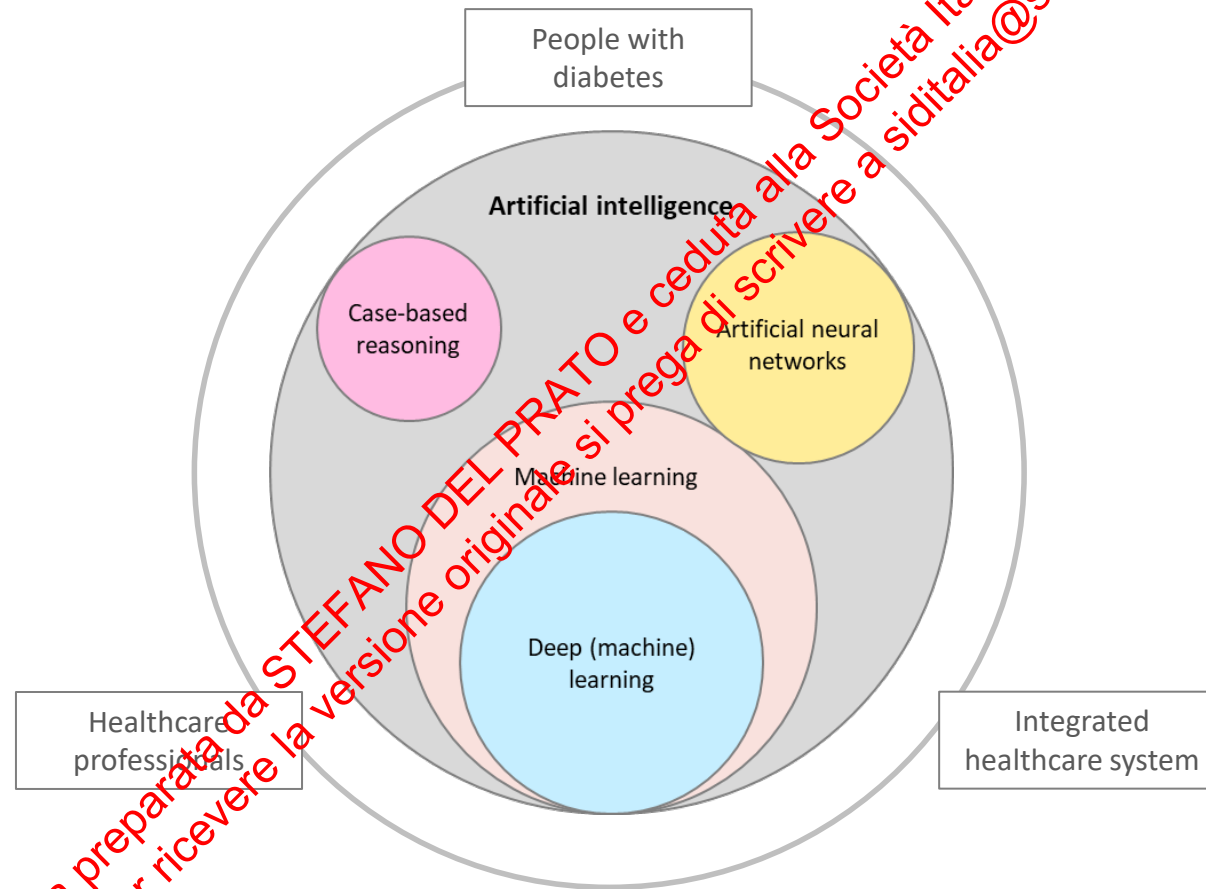
Remission of T2DM and Improvement in Metabolic Markers with the Twin Precision Treatment Technology (TPT)—A Multicenter, Randomized, Controlled Trial

The TPT intervention uses the Whole-Body Digital Twin Platform, with AI and Internet of Things, to integrate multi-dimensional data to give precision nutrition and health recommendations via the TPT app and by coaches. Baseline mean age, diabetes duration and HbA1C obtained in 319 pts were 45y ($\pm 9.7y$), 3.9y ($\pm 2.9y$) and 9.0% ($\pm 2.9\%$), respectively.

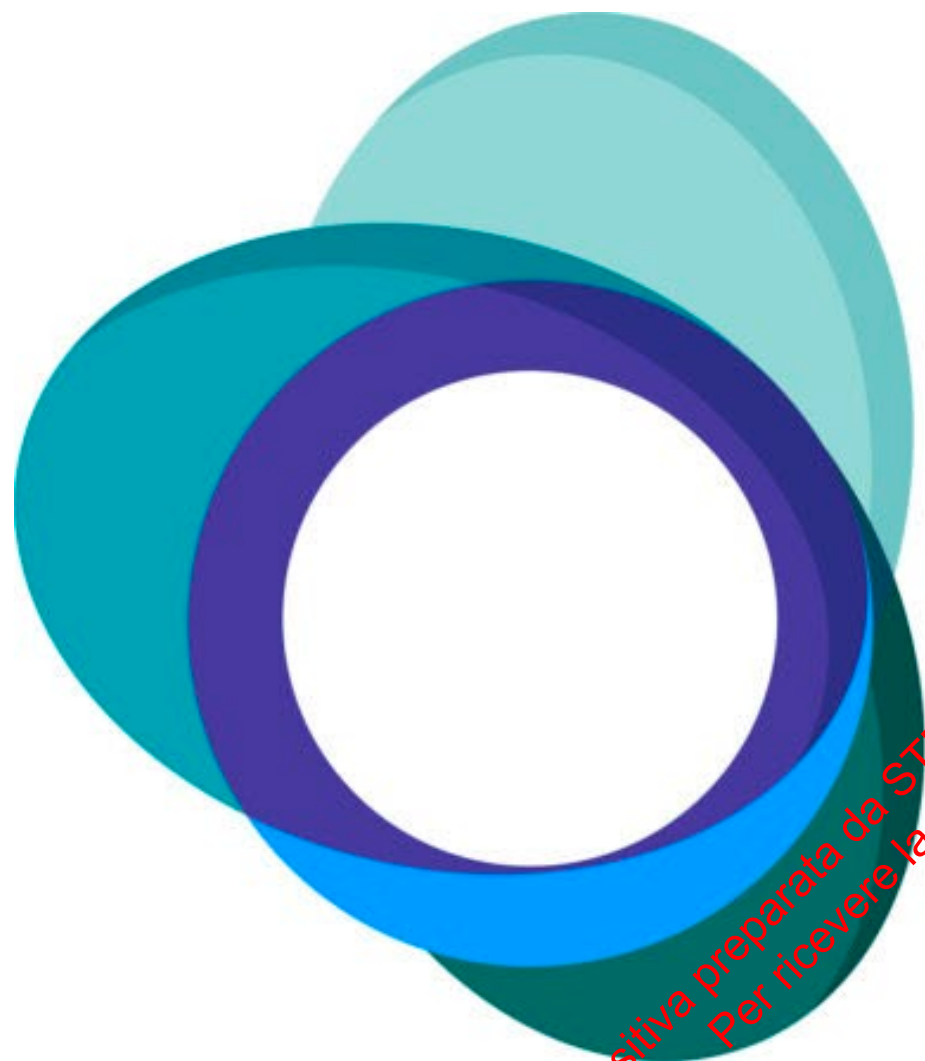
Clinical & Biochemical parameters	TPT Group (N=199)				SC Group(N=63)			
	Baseline Mean (SD)	180 days Mean (SD)	Mean difference (SD)	P value	Baseline Mean (SD)	180 days Mean (SD)	Mean difference (SD)	P value
HbA1C (%)	9.0 (1.8)	5.2 (0.5)	-3.3 (1.8)	<0.001	8.5 (2.0)	8.1 (1.7)	-0.4 (1.4)	0.0279
Fasting Plasma Glucose (mg/dl)	170.2 (59.9)	99.9 (18.2)	-74.3 (60.4)	<0.001	159.8 (62.5)	155.0 (60.2)	-6.3 (85.4)	0.552
Time in Range (TIR) (%)	52.8 (32.3)	81.1 (20.3)	28.3 (40.4)	<0.001	61.2 (29.2)	51.6 (25.2)	-10.0 (24.8)	0.003
TAR1 (%)	24.9 (17.0)	12.2 (2.9)	-23.7 (17.6)	<0.001	19.9 (15.7)	21.4 (14.1)	1.5 (17.0)	0.472
TAR2 (%)	19.3 (25.9)	0.1 (1.2)	-19.2 (25.9)	<0.001	15.4 (24.4)	23.7 (24.5)	8.3 (20.0)	0.001
GMI (%)	7.7 (1.6)	5.6 (0.4)	-2.2 (1.5)	<0.001	7.3 (1.7)	7.7 (1.4)	0.4 (1.4)	0.0432
CV (%)	13.3 (5.6)	17.1 (5.4)	-6.2 (7.2)	<0.001	24.6 (5.4)	22.7 (4.6)	-1.9 (5.6)	0.0096
SBP (mmHg)	137.4 (11.4)	116.9 (10.4)	-10.4 (9.8)	<0.001	132.3 (17.1)	130.1 (14.9)	-2.2 (17.1)	0.3126
DBP (mmHg)	88.1 (7.1)	78.1 (7.1)	-6.6 (7.1)	<0.001	86.9 (11.0)	84.0 (9.4)	-2.9 (10.7)	0.0361
Weight (kg)	77.3 (14.4)	71.4 (11.4)	-10.7 (5.9)	<0.001	72.3 (12.7)	72.0 (12.1)	-0.3 (3.4)	0.5503
BMI (kg/m2)	29.7 (4.2)	28.1 (4.1)	-3.8 (2.2)	<0.001	28.1 (4.2)	28.1 (4.1)	-0.007 (1.5)	0.9703
WC (cm)	102.7 (6.8)	94.8 (10.9)	-7.9 (6.8)	<0.001	94.8 (10.9)	95.3 (12.2)	0.5 (10.9)	0.7219
LDL-C (mg/dL)	127.5 (40.5)	116.7 (31.8)	-10.8 (40.5)	0.387	116.7 (31.8)	115.7 (34.9)	-1.0 (28.7)	0.7733
HDL-C (mg/dL)	34.8 (6.9)	35.3 (8.2)	0.5 (8.2)	<0.001	35.4 (7.0)	35.3 (7.4)	-0.01 (5.1)	0.8727
TG/HDL	7.1 (7.5)	3.9 (2.1)	-3.9 (2.1)	<0.001	6.4 (3.6)	7.0 (5.5)	0.5 (4.7)	0.3684
TG (mg/dL)	223.5 (181.5)	128.7 (74.8)	-94.8 (172.8)	<0.001	214.2 (97.1)	222.0 (128.9)	7.8 (100.6)	0.5403
HOMA-IR (%)	1.9 (0.9)	1 (0.5)	-0.9 (0.8)	<0.001	1.9 (1.0)	2.2 (1.4)	0.3 (1.2)	0.0968
HOMA 2B (%)	51.5 (30.6)	88 (31.3)	36.5 (38.5)	<0.001	60.4 (38.5)	66.9 (41.6)	6.4 (40.2)	0.2101
NAFLD Fibrosis Score	-2.3 (1)	-3.3 (1.1)	-1 (1.1)	-1.9 (1.2)	-2.1 (1.3)	-0.2 (0.8)	0.0166	-1.9 (1.2)
NAFLD Liver Fat Score	0.7 (1.8)	-1.6 (1)	-2.3 (1.7)	0.8 (2.1)	0.9 (1.9)	0.2 (2.1)	0.5871	0.8 (2.1)
Urine Microalbumin to Creatinine ratio (mg/g)	39.6 (98.8)	15.6 (60.9)	-23.9 (89.8)	<0.001	31.1 (60.2)	41.6 (115.0)	10.5 (86.0)	0.3363

Shamanna P et al. 84° ADA Scientific Sessions, San Diego, 2023

Artificial Intelligence and Clinical Decision Support Systems in Diabetes



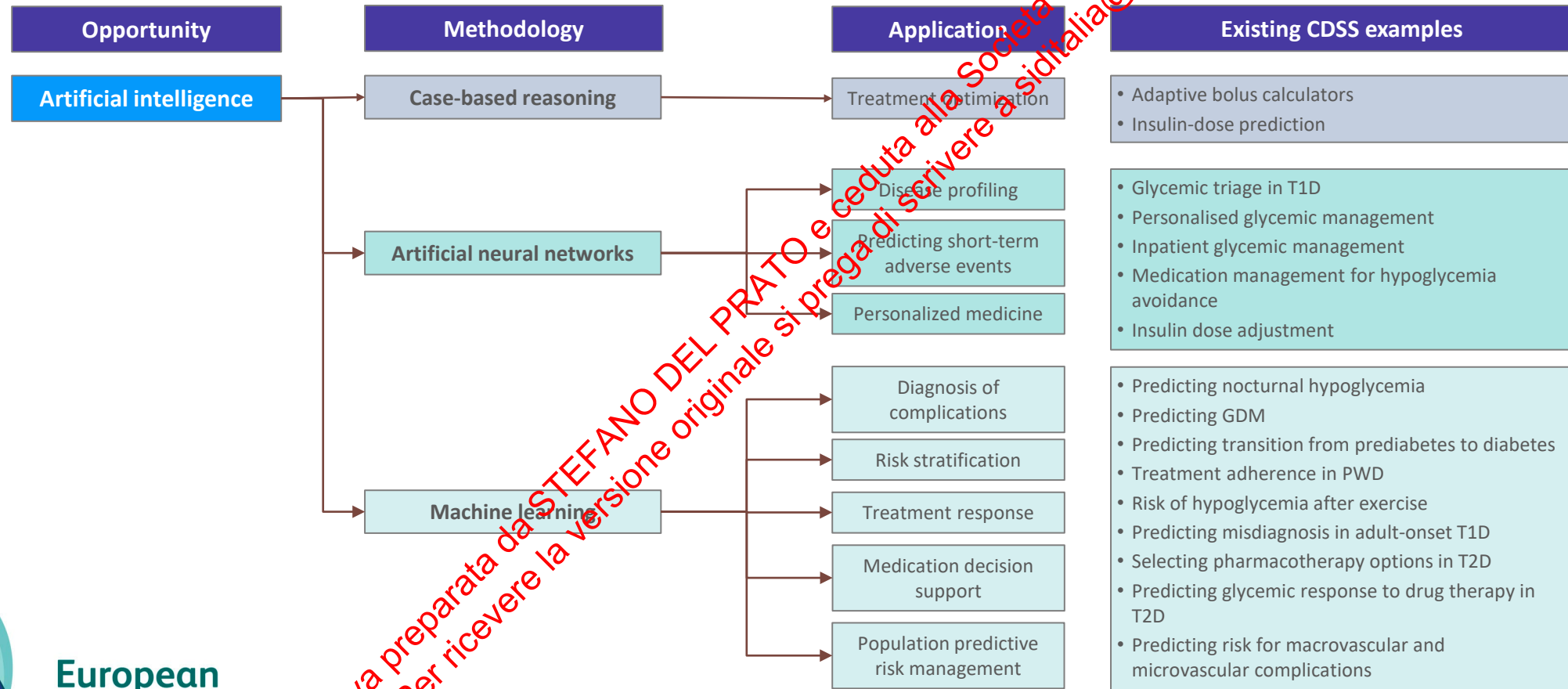
The graphic illustrates the separate and related aspects of AI that are being emphasised and applied in the development of diabetes CDSS to date.



European Diabetes Forum

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AI-driven Clinical Decision-support Systems (DSS) to Assist Healthcare Professionals and People with Diabetes at the Point of Care: Developing a Roadmap



European
Diabetes Forum

The graphic illustrates the path from concept to application for separate AI approaches that are being applied in the development of diabetes CDSS to date, and how each aspect of AI is emphasised for different CDSS tools. These are real-world CDSS examples that have been built as proof-of-concept tools and validated for clinical decision making.

EUDF Working Group Composition

Mia Barjamagic

Tadej Battelino

Xavier Cos

Nancy Cui

Stefano Del Prato

Angus Forbes

Alfonso Galderisi

Luz Heineman

IDF Europe

EASD/EFSD

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FEND

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Christian Holm Jönsson

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Nebojsa Lalic

Moshe Phillip

Peter Schwarz

Bart Torbeyns

Noah Wanebo

EFPIA

MedTech Europe

SFD

IDF Europe

EASD/EFSD

EASD/EFSD

EUDF

MedTech Europe

AI
DIABETES
CLINICAL DECISION
SUPPORT

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Google Health's Chief Clinical Officer Talks About Incorporating AI in Health Care

Rebecca Voelker, MSJ

This conversation is part of a series of interviews in which JAMA Editor in Chief Kirsten Bibbins-Domingo, PhD, MD, MAS, and expert guests explore issues surrounding the rapidly evolving intersection of artificial intelligence (AI) and medicine.

*We talk about how artificial intelligence is going to change a lot of things, and it should happen **with clinicians** not **to clinicians**.*

Bibbins-Domingo, PhD, MD, MAS, editor in



Summary

- Guidelines have provided a step forward in a more appropriate management and treatment of T2DM diabetes, but
- They have limits imposed by selected study populations and rigid study conducts that make difficult to account for individual variability as it can be depicted by deep phenotyping
- AI has the potential to change the way diseases are prevented, detected, and managed, which can help in improving population health status and rationalize health care expenditure
- Case-based reasoning, machine learning, deep learning, neural networks, and digital twin technology can enable predictive population risk stratification, enhanced decision making, and self-management.
- AI is expected to impact positively medical professionals by supporting decision making and remote monitoring.

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Challenges and Opportunities for AI-Driven Clinical Decision Support Systems in Diabetes



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60th Annual Meeting

European Association for the Study of Diabetes

9 - 13 September 2024

Madrid, Spain



Join us in Madrid to celebrate the 60th EASD Annual Meeting!

Stay up to date – EASD 2024 is the interface between discovery science and clinical practice where key discussions take place that will move the diabetes field forward!

Connect and interact – it will be inspiring and energising to be surrounded by colleagues from all over the world working towards the same goal!

Submit your abstract – EASD 2024 will be the perfect platform for your diabetes research to be recognised and discussed!

Key dates

15 March – Registration opening

3 April – Abstract submission deadline

17 July – Early registration deadline

SCAN ME



#EASD2024

easd.org

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