

DIABETE TIPO 1

COME È CAMBIATO
IL TRATTAMENTO INSULINICO?

BARI | 16-17 OTTOBRE 2020

**L'aderenza terapeutica quale cardine per
l'ottimizzazione del controllo glicometabolico**



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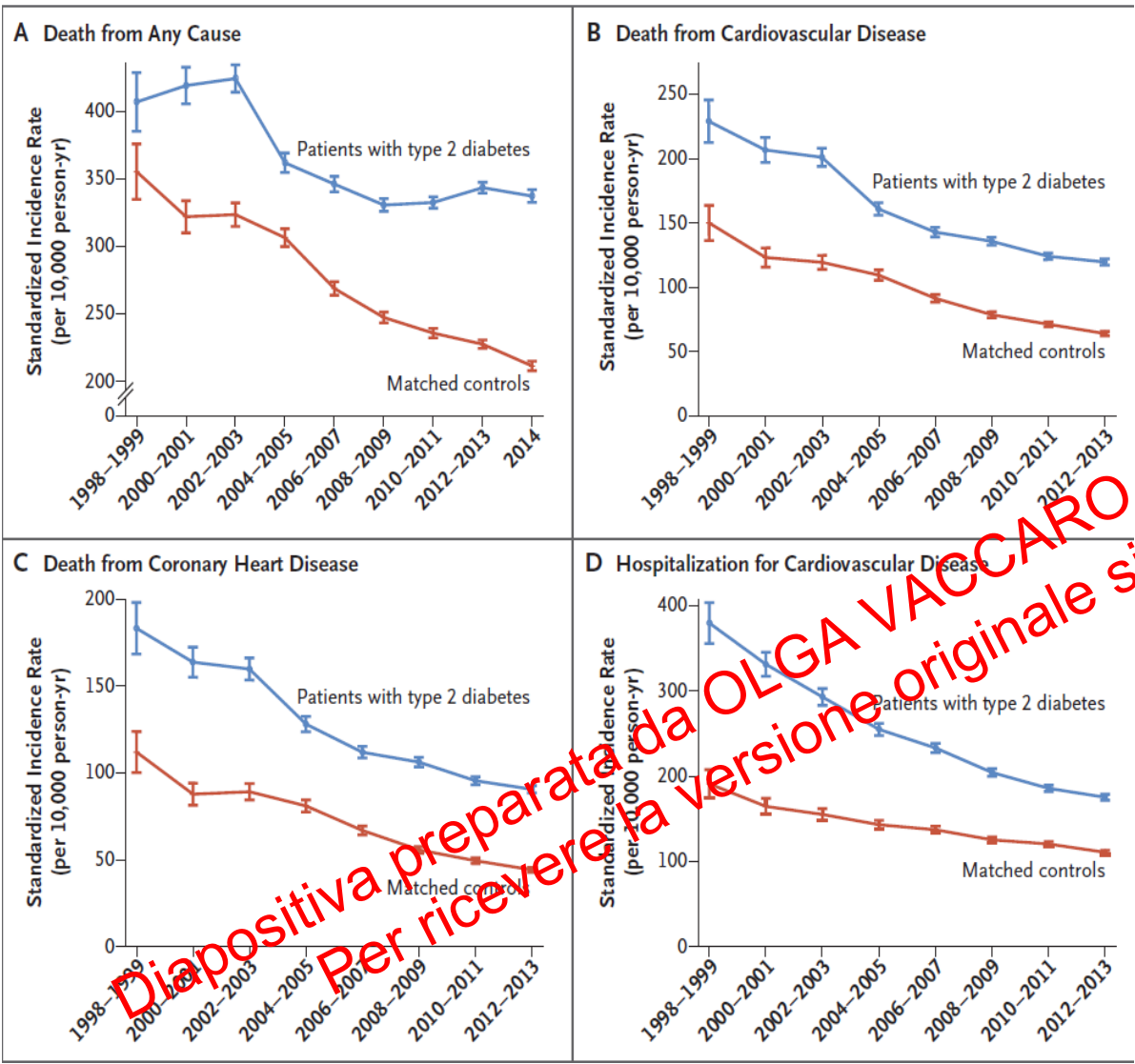
Definizione di malattia cronica –WHO

Diseases which have one or more of the following characteristics:

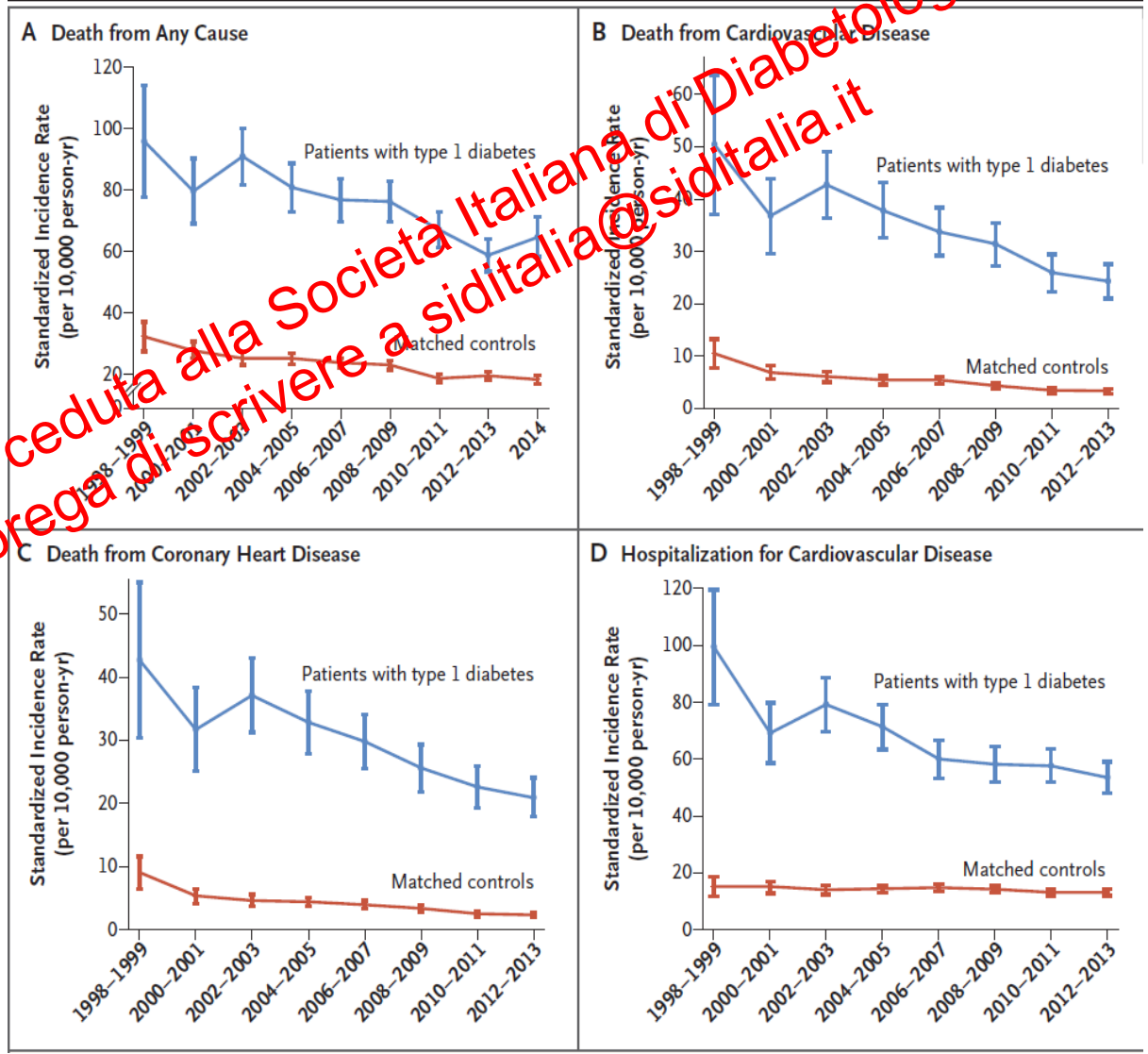
- ***they are permanent***
- ***leave residual disability***
- ***are caused by nonreversible pathological alteration***
- ***require special training of the patient for rehabilitation***
- ***require a long period of supervision, observation or care***

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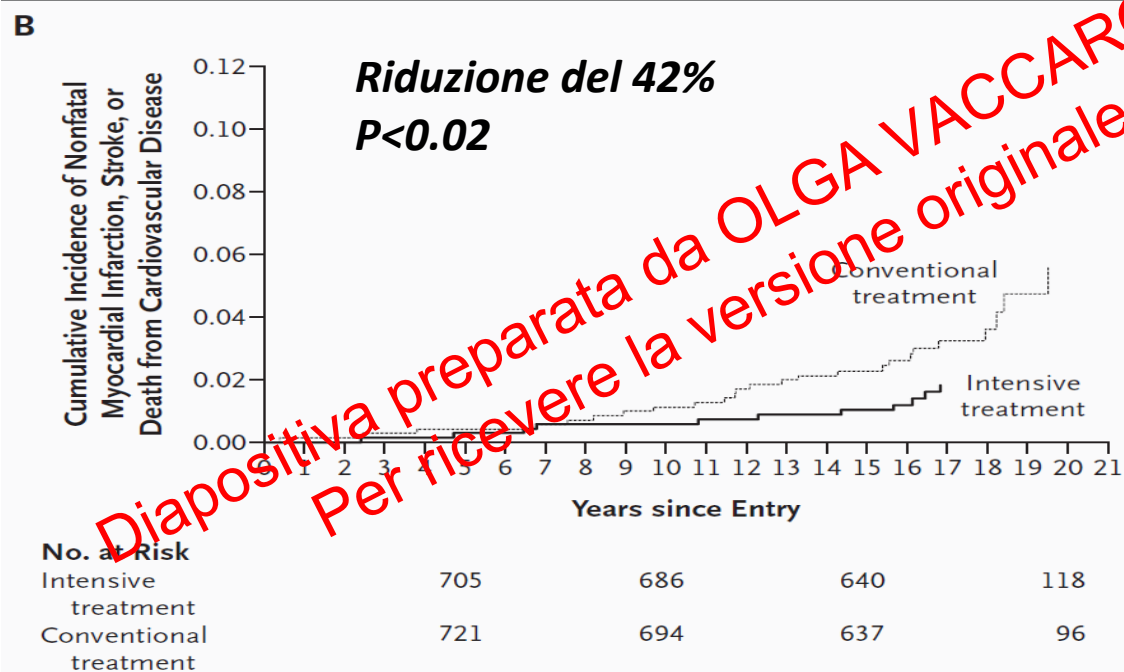
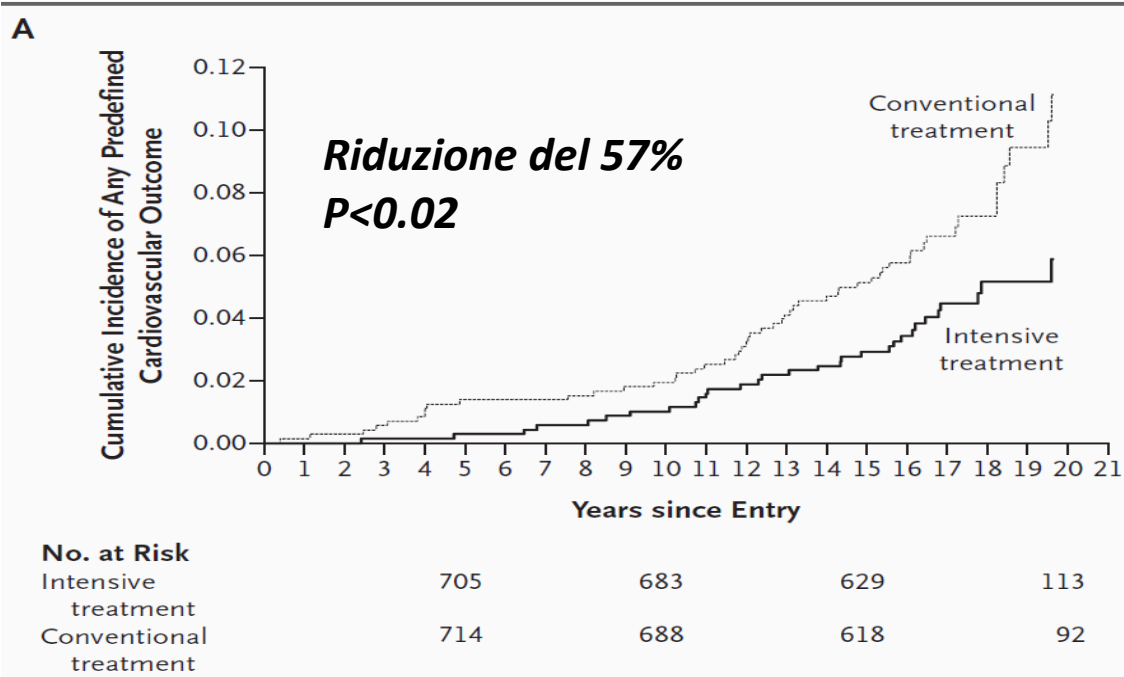
Diabetes-related deaths in the Swedish NDR, 1998-2014



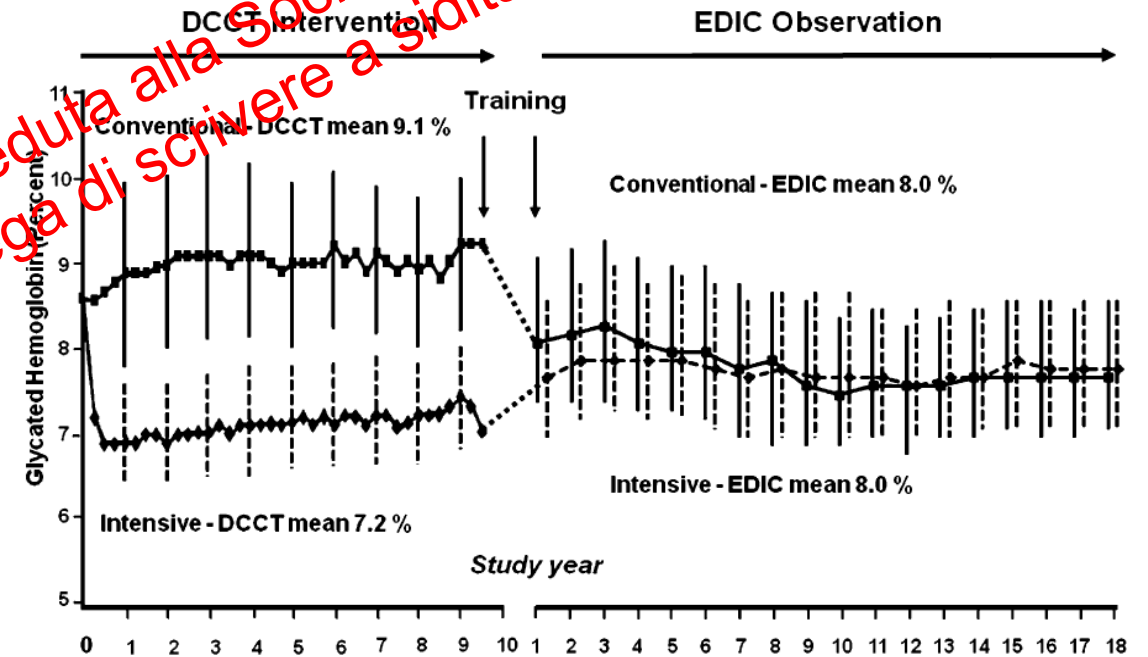
TIPO 2



TIPO 1

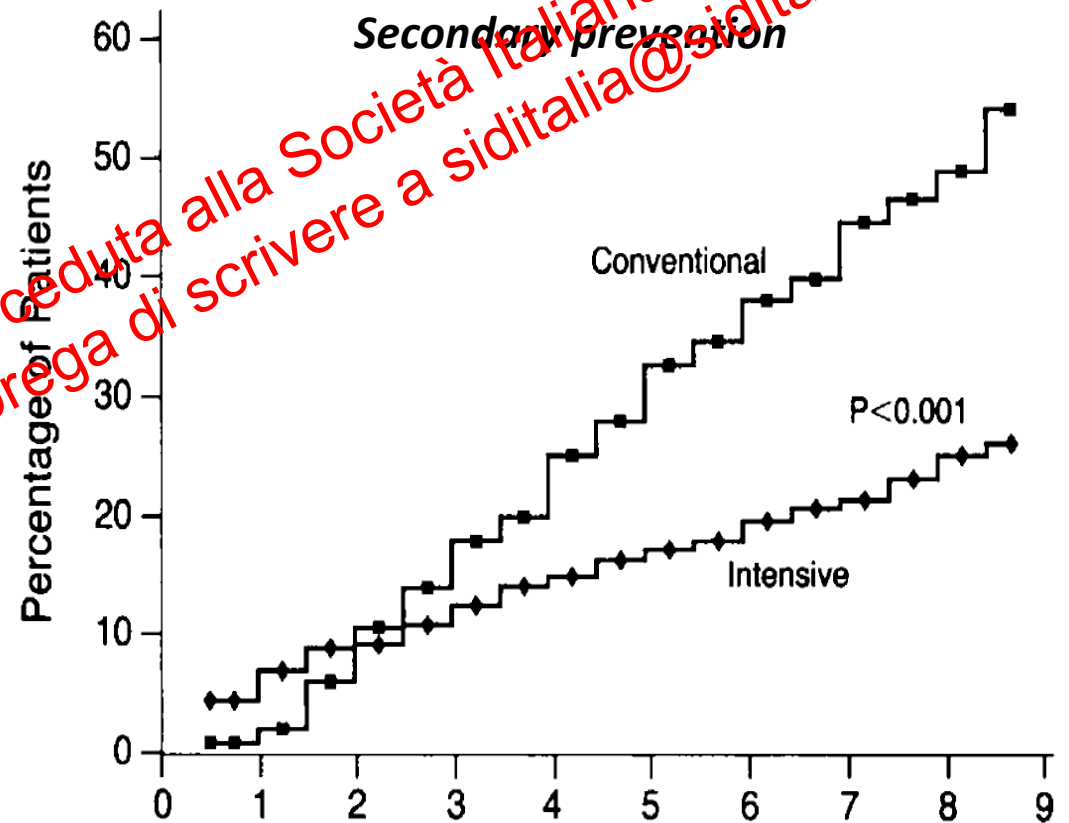
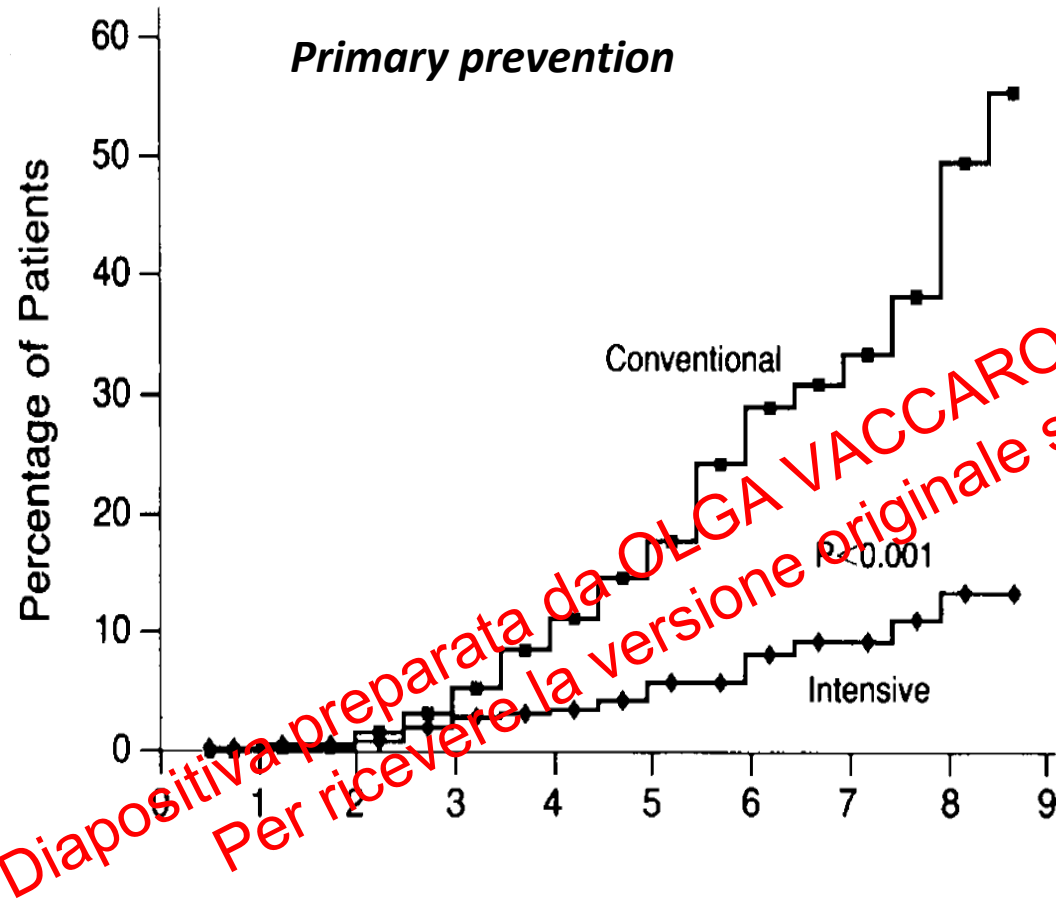


Intensive Diabetes Treatment and Cardiovascular Disease in Patients with Type 1 Diabetes



DCCT-EDIC *N Engl J Med* 2005

Incidenza di retinopatia nel gruppo di trattamento intensivo intervento e nel gruppo di controllo – studio DCCT



DCCT N Engl J Med 1993

Proportion of patients with type 1 diabetes and with HbA1c <7% in different data sets

- USA 23 % (*McCarthy Nurs Res* 2016)
- Spain 26% (*Sastre J, Endocrinologia y Nutricion* 2012)
- Venezuela 10 % (*Moreira EB, Diabetes Res Clin Pract* 2010)
- Brazil 11 % (*Mendes AB, Acta Diabetol* 2010; *Andreade CS, BMJ Open* 2017)

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Livelli di HbA1c e Fattori di Rischio Maggiori nei pazienti con diabete tipo 1

	Donne	Uomini
Soggetti con HbA1c $\leq 7,0\%$	25,9	30,8
Soggetti con HbA1c $\geq 8,0\%$	39,4	34,4
Soggetti con colesterolo LDL < 100 mg/dl	49,4	49,4
Soggetti con colesterolo LDL ≥ 130 mg/dl	16,4	17,2
Soggetti con pressione arteriosa $\geq 140/90$ mmHg	24,3	30,7
Soggetti con BMI ≥ 30 Kg/m ²	13,0	11,8
Soggetti con micro/macroalbuminuria (%)	23,0	28,7
Soggetti con eGFR < 60 mg/dl*1.73 m ² (%)	8,3	6,7
Soggetti fumatori (%)	21,6	30,1

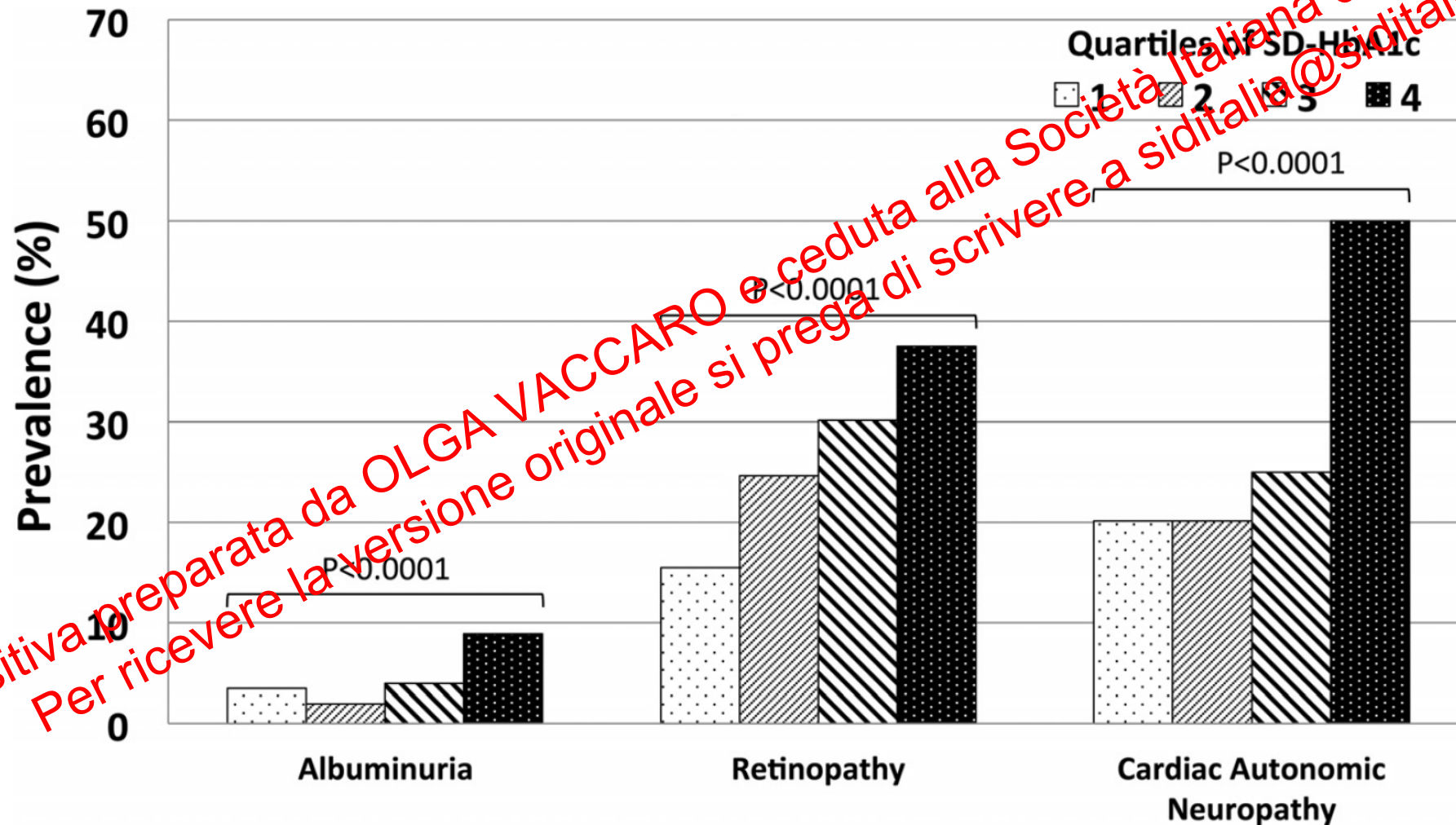
Table 1 General characteristics of the study population

	Total n = 575
Age (years)	36 ± 12
Diabetes duration (years)	19 ± 11
Early onset T1D (1–10 years of age) (%)	31.3
Age of T1D onset (years)	16.8 ± 10.8
Waist circumference (cm)	86.0 ± 11.8
BMI (kg/m ²)	25.1 ± 3.6
→ HbA1c (%)	7.7 ± 1.2
→ SBP (mmHg)	121 ± 16
DBP (mmHg)	75 ± 10
Total cholesterol (mg/dl)	178 ± 34
→ LDL-cholesterol (mg/dl)	101 ± 29
HDL-cholesterol (mg/dl)	62 ± 16
Triglycerides (mg/dl)	79 ± 52
eGFR (CKD-EPI) (ml/min/1.73 m ²)	101.8 ± 18

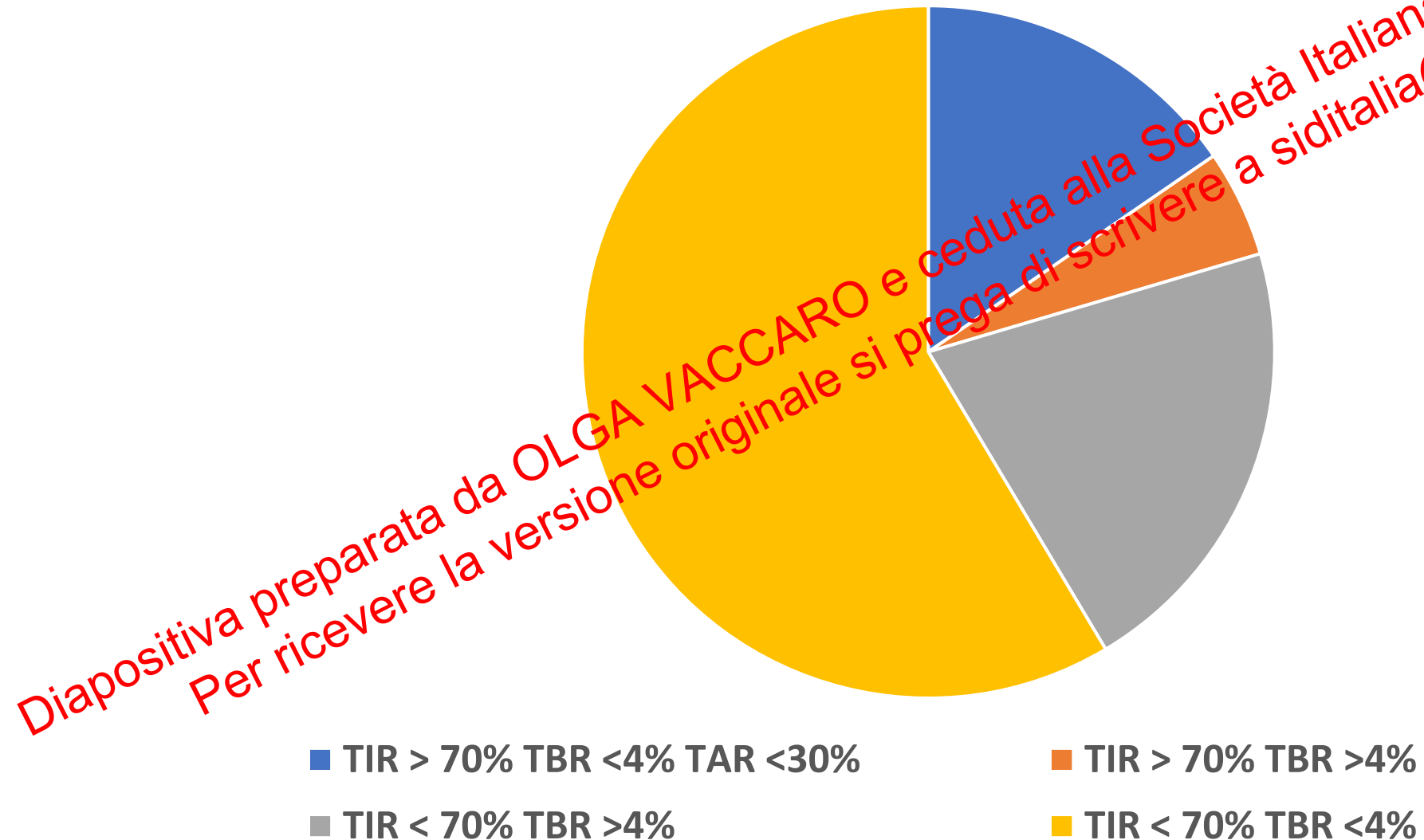
575 pazienti con diabete tipo 1 seguiti presso un centro di terzo livello

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Association Between HbA1c Variability and Risk of Microvascular Complications in Adolescents With Type 1 Diabetes



Metriche CGM in un campione casuale di 195 pazienti con diabete tipo 1 seguiti presso un centro di terzo livello e che utilizzano i CGM



Fattori associati a valori di HbA1c $\geq 7\%$

Dati di 67 cliniche per il diabete in USA

Logistic regression analysis of factors associated with HbA1c $\geq 7\%$.

Factor	Adjusted Odds Ratio	95% CI
Education		
<High school diploma	Reference	
Bachelor degree	0.53	0.34–0.81
Master degree	0.43	0.27–0.66
Professional or doctoral degree	0.40	0.25–0.66
Employment		
Retired	Reference	
Full- or part-time	1.7	1.3–2.1
Student	1.7	1.2–2.4
Marital status		
Married	Reference	
Single	1.6	1.3–1.9
General health		
Good-excellent	Reference	
Fair-poor	1.6	1.2–2.1
Missed insulin dose		
Almost never	Reference	
<once/month	1.5	1.2–1.8
<once/week	2.2	1.8–2.8
1–2 $\times$ /week	3.9	2.9–5.1
3–4 $\times$ /week	4.2	2.7–6.4
$\geq 5 \times$ /week	4.6	2.0–10.9
At least 1 $\times$ /day	5.02	2.1–11.8
Blood glucose checks/day (each 1-check $\uparrow$)	0.91	0.88–0.93
Use of continuous glucose monitor		
No	Reference	
Yes	0.74	0.6–0.9
T1D duration (each 1-year $\uparrow$)	1.02	1.01–1.02

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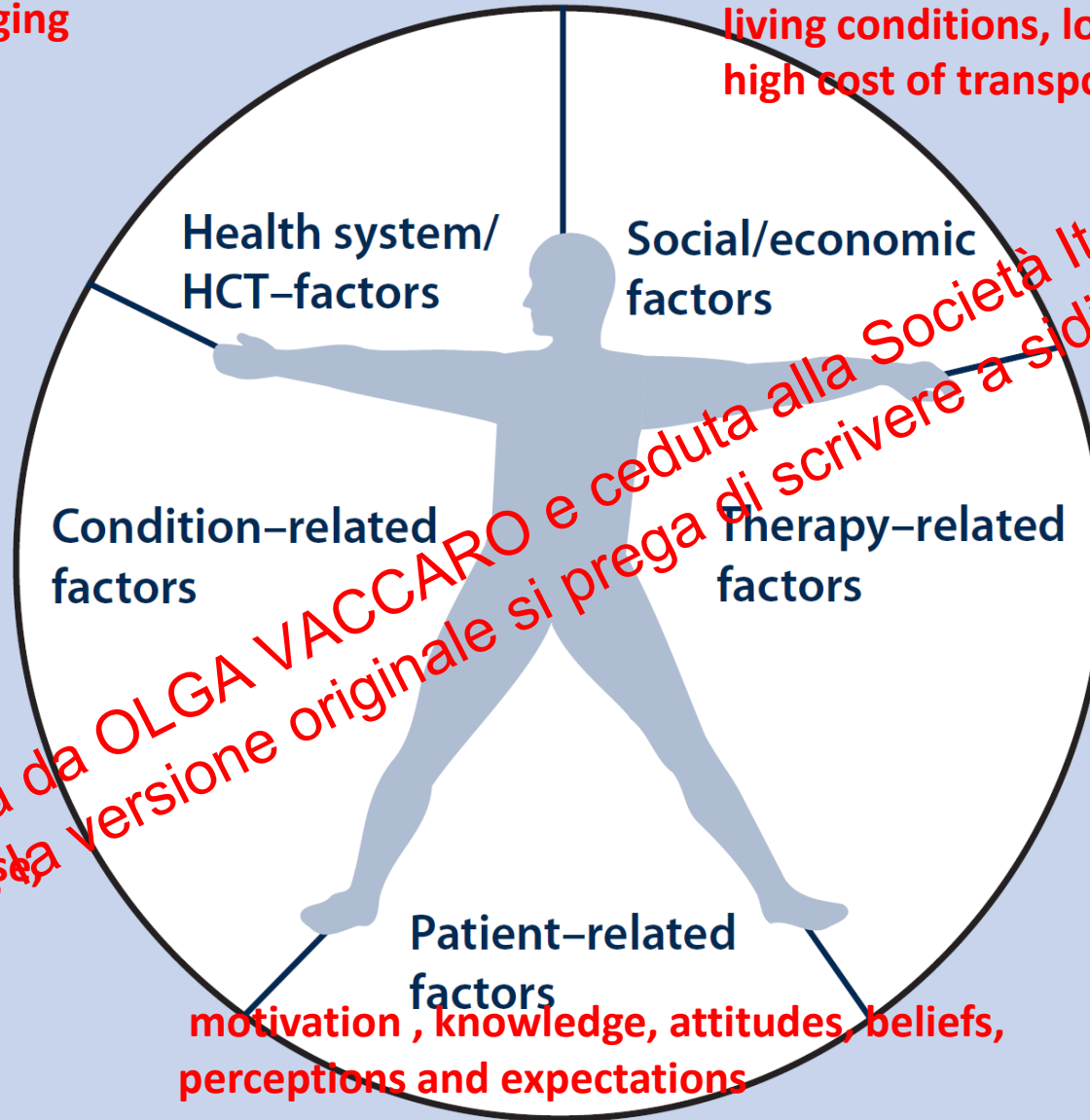
Definizione di aderenza alla terapia a lungo termine - WHO

the extent to which a person's behaviour – taking medication, following a diet, and/or executing lifestyle changes, corresponds with agreed recommendations from a health care provider

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poorly developed health services
lack of knowledge and training for
health care providers on managing
chronic diseases,
short consultations,
weak capacity of the system to
educate patients and establish
self-management capacity,
lack of knowledge on effective
interventions for improving
adherence

poor socioeconomic status, low level of education,
lack of effective support network, unstable
living conditions, long distance from treatment centre,
high cost of transport, high cost of medication



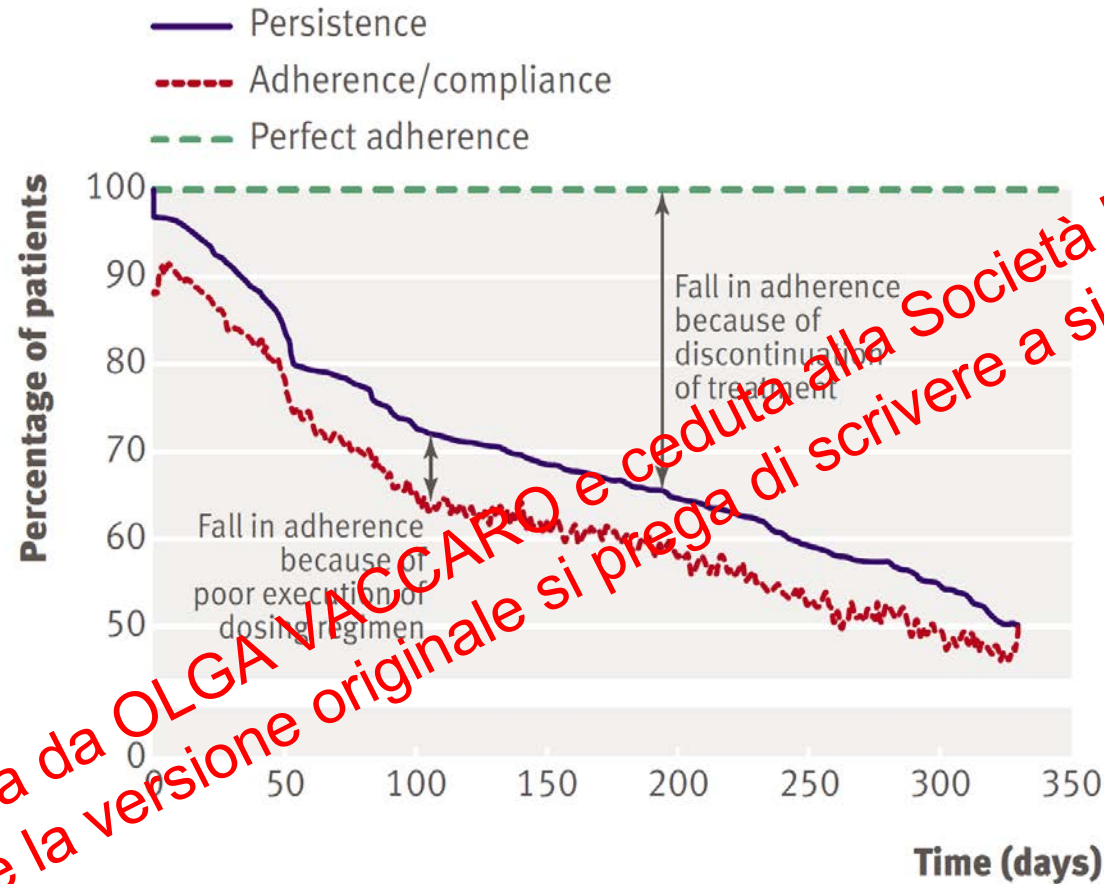
complexity of the medical
regimen, duration of
treatment, previous
treatment failures, the
immediacy of beneficial
effects, side-effects, and the
availability of medical
support to deal with them.

severity of symptoms,
level of disability, rate of
progression of the disease,
Co-morbidities, such as
Depression, drug and
alcohol abuse

motivation, knowledge, attitudes, beliefs,
perceptions and expectations

HCT, Health-car

Time course of Persistence, Adherence and compliance



No of patients remaining in study	3108	980	828	618	474	400	331
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Metodi per la valutazione della aderenza terapeutica

Method	Type of Data	Advantages	Disadvantages	Method	Type of Data	Advantages	Disadvantages
Drug level in biologic fluids	Qualitative	Recent use verified	Data limited to recent use Patient-specific kinetic variations	Adherence questionnaire	Qualitative	Easy to administer (on site, mail, phone) Validated May explain patient behavior	Lack of continuous data Accuracy is instrument dependent
Biologic markers	Qualitative	Recent use verified	Data limited to recent use Patient-specific kinetic variations	Pill count	Quantitative	Easy to use Inexpensive	No data on regimen adherence Patient may forget or alter unused portion
Direct patient observation	Quantitative	Verified use	Impractical in outpatient setting	Prescription record review, manual	Quantitative	Noninvasive	Limited to specific location
Patient interview	Qualitative	Easy to use Inexpensive	Influenced by question construction and interviewer's skill	Prescription record review, electronic	Quantitative	Noninvasive Long-term data Large populations	Knowledge of database required Validity of variables
Patient-kept diary	Quantitative	Only self-report method with regimen data	Potential for overestimation Patient must return diary	Electronic monitoring	Quantitative	Precise data on regimen adherence	Expensive Inconvenient

- **MPR** (Medication Possession Ratio): numero di giorni di effettiva disponibilità del farmaco, prescritto e dispensato al paziente, diviso per il numero di giorni di osservazione
- **PDC** (Proportion Days Covered): periodo coperto dalla prescrizione, diviso il numero di giorni di osservazione
- **Paziente aderente** = $MPR > 0,8$ **PDC 80%**
- **Buona aderenza** = $MPR > 0,9$ **PDC 90%**

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Principali vantaggi e svantaggi delle misure indirette di aderenza terapeutica

- **Advantages:**

- Uses pharmacy claims data
- Relatively easy to calculate

- **Disadvantages:**

- Presence of pharmacy claim does not indicate medication taken
- Can overestimate adherence if patients refill prescriptions early
- Pharmacy claims data affected by wastage and stockpiling
- Relies on days supply in calculation
- Does not account for differences in insulin pack size

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Predittori di aderenza

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Correlates of Insulin Injection Omission

	B	SE	β	Significance
Female sex*	-0.045	0.067	-0.028	0.499
White race/ethnicity†	-0.006	0.073	-0.003	0.936
→ Current age (years)	-0.015	0.003	-0.256	<0.001
Education‡				
Some college	-0.001	0.076	-0.001	0.990
College graduate	-0.023	0.100	-0.010	0.818
Graduate school	0.305	0.121	0.109	0.012
→ Employment§				
Not employed (student)	0.273	0.125	0.094	0.030
Not employed (disabled)	-0.317	0.120	-0.107	0.009
Part-time employment	-0.136	0.104	-0.051	0.192
Full-time employment	-0.108	0.078	-0.061	0.166
Household income (\$)	-0.068	0.017	-0.176	<0.001
History of depression	0.048	0.072	0.028	0.504
History of cardiovascular disease	-0.028	0.072	-0.016	0.699
History of obesity	-0.062	0.070	-0.038	0.571
Type 2 diabetes	0.428	0.092	0.226	<0.001
Duration of diabetes	0.001	0.004	0.019	0.686
Diabetes care provider¶				
Endocrinologist	-0.085	0.077	-0.048	0.270
Nonphysician	-0.169	0.102	-0.066	0.096
Engage in physical activity	-0.093	0.071	-0.057	0.186
Follow healthy diet	-0.157	0.069	-0.098	0.023
Use insulin pen#	-0.001	0.074	-0.001	0.989
Needle change frequency	-0.049	0.070	-0.031	0.479
→ Daily injection frequency	0.118	0.025	0.205	<0.001
→ Plan daily activities around insulin injections	0.247	0.079	0.129	0.002
→ Interference with activity of daily living	0.112	0.033	0.146	0.001
→ Dissatisfaction with injection pain	0.130	0.042	0.149	0.002
→ Dissatisfaction with injection embarrassment	0.146	0.041	0.169	<0.001

Internet survey of 502 U.S. insulin-treated adults with type 1 or type 2 diabetes

57% reported intentional insulin omission (20% regular omission)

Risk factors for insulin omission

- younger age
- lower income and higher education
- type 2 diabetes
- not following a healthy diet
- daily injections frequency
- interference with daily activities
- injection pain and embarrassment.

Cause di omissione/non aderenza per i pazienti (n=530) per i medici (n=964) in ordine di importanza

Reason	Patients % and rank	Physicians % and rank
Too busy	18.9% 1	41.9% 3
Travelling	16.2% 2	41.8% 3
Skipped meal	15.0% 3	44.8% 1
Stress or emotional problems	11.7% 4	32.2% 5
Embarrassing to inject in public	9.7% 5	36.8% 4
Challenging to take it at the same time everyday	9.4% 6	29.1% 6
Forgot	7.4% 7	2.0% 11
Too many injections	6.0% 8	26.4% 7
Avoid weight gain	4.0% 9	13.4% 9
Regimen is too complicated	3.8% 10	16.8% 8
Injections are painful	2.6% 11	7.8% 10

Pazienti e medici attribuiscono una diversa importanza alle barriere alla terapia insulinica ed in generale esse sono maggiori nella percezione dei medici

Table 2—Odds ratios, 95% CI, and P values for multivariate model of factors associated with diabetes medication adherence

	Odds ratio	95% CI	P
Patient factors			
Patient exposure to diabetes therapy			
New to therapy vs. continuing therapy	0.39	0.38, 0.40	<0.0001
Patient age-group (years)			
25–44 vs. 45–64	0.51	0.49, 0.53	<0.0001
65–74 vs. 45–64	1.27	1.23, 1.30	<0.0001
>75 vs. 45–64	1.41	1.37, 1.44	<0.0001
Patient sex			
Male vs. female	1.14	1.12, 1.16	<0.0001
Patient education			
Vocational vs. high school equivalent	1.06	0.92, 1.22	0.4105
College grad vs. high school equivalent	1.20	1.17, 1.23	<0.0001
Graduate school vs. high school equivalent	1.41	1.36, 1.46	<0.0001
Patient income			
\$30k to \$60k vs. <\$30k	0.93	0.91, 0.95	<0.0001
>\$60k vs. <\$30k	1.27	1.23, 1.30	<0.0001
Patient geographic region			
Midwest vs. West	1.12	1.08, 1.16	<0.0001
Northeast vs. West	1.04	1.00, 1.08	0.0448
South vs. West	1.00	0.97, 1.03	0.9475
Prescription factors			
Prescription drug channel mail vs. retail	2.09	2.04, 2.13	<0.0001
Total pill burden	1.22	1.21, 1.22	<0.0001
Out-of-pocket costs (30 days)	0.89	0.89, 0.89	<0.0001
Prescriber factors			
Specialty: endocrinologist vs. primary care	1.01	0.96, 1.07	0.6076
Specialty: other specialist vs. primary care	0.91	0.89, 0.94	<0.0001
Prescriber age	1.002	1.002, 1.003	0.004

Determinants of Adherence to Diabetes Medications: Findings From a Large Pharmacy Claims Database

200,000 patients treated with noninsulin medications in 2010

Adherence was defined as a medication possession ratio >0.8.

Kirkman MS, Diabetes Care 2015

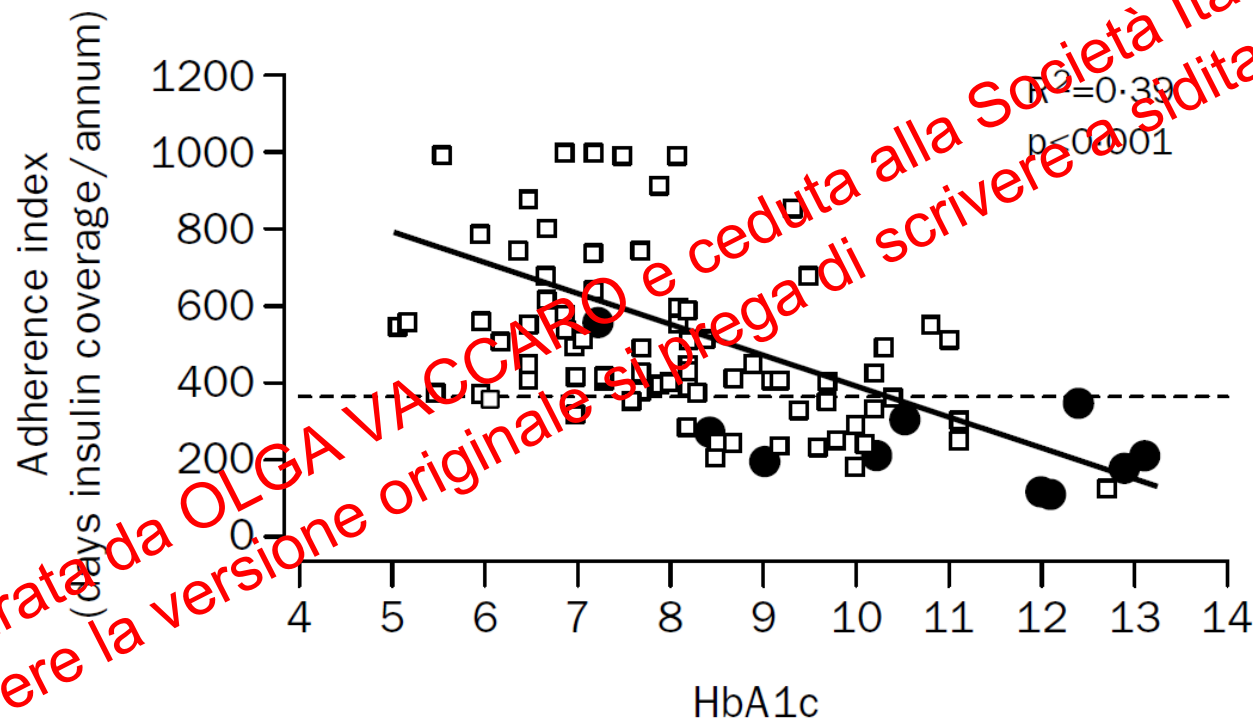
Impatto della non aderenza sul compenso glicemico e sulle complicanze

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Table 2 Factors associated with HbA1c levels in Brazilian patients with type 1 diabetes

Independent variable	Participants, n	HbA1c means in % (SD)	β Coefficient (95% CI)	P value
Block 1 – sociodemographic				
Age (years)				
18–29	296	9.35 (2.36)	Ref	0.198
30–49	412	9.54 (2.28)	0.186 (–0.146 to 0.517)	
≥50	271	9.24 (1.95)	–0.118 (–0.484 to 0.248)	
Education				
At least some college	154	9.13 (1.82)	Ref	0.002
Secondary/high school	424	9.21 (2.15)	0.084 (–0.325 to 0.492)	
Primary school or less	398	9.70 (2.40)	0.565 (0.154 to 0.977)	
Block 2 – behavioural				
Self-perception of adherence to diet →				
Excellent	129	8.79 (2.22)	Ref	<0.001
Good	327	9.13 (2.09)	0.344 (–0.103 to 0.792)	
Fair/poor	623	9.72 (2.25)	0.931 (0.508 to 1.354)	
Self-perception of adherence to insulin →				
Excellent	130	9.28 (2.12)	Ref	<0.001
Good	144	9.59 (2.30)	0.315 (–0.074 to 0.703)	
Fair/poor	62	10.82 (2.49)	1.543 (0.978 to 2.107)	
Participation in lecture for diabetes in the last year				
Yes	345	9.11 (2.09)	Ref	<0.001
No	540	9.67 (2.31)	0.549 (0.247 to 0.850)	

Adherence to insulin treatment, glycaemic control and ketoacidosis in type 1 diabetes



The impact of treatment non-compliance on mortality in people with type 1 D

UK General Practice

Baseline characteristics according to diagnosis of medication non-compliance and clinic non-attendance.

	Adherent		Non-compliant/ DNA		p
N	2079		867 29%		
Gender					
Male	1216	58.5%	515	59.4%	0.647
Female	863	41.5%	352	40.6%	
Smoking status					
Non-Smoker →	1494	71.9%	523	60.3%	<0.001
Current Smoker	228	11.0%	116	13.4%	
Ex-Smoker	357	17.2%	228	26.3%	
Age (years)	27.9	17.2	29.0	17.4	0.090
BMI →	23.7	4.9	24.6	5.0	0.001
HbA1c (%) →	8.5	1.5	8.8	2.0	<0.001
HbA1c (mmol/mol)	69	14	73	17	
Cholesterol (mmol/L)	4.7	1.0	4.7	1.1	0.731
Systolic blood pressure (mmHg)	124.1	18.1	124.3	16.7	0.799
Diastolic blood pressure (mmHg) →	72.4	11.0	73.9	10.7	0.005
Charlson index	1.5	0.9	1.6	0.9	0.123
PCP contacts in prior 12 months →	3.9	4.6	7.0	8.9	<0.001
Prior large vessel disease	63	3.0%	31	3.6%	0.443
Prior renal disease	14	0.7%	9	1.0%	0.305
Prior visual complication	147	7.1%	62	7.2%	0.938

Multivariate Cox regression model of medication non-compliance and clinic non-attendance on mortality risk.

	Hazard ratio	95.0% CI		p
		Lower	Upper	
Age (years)	1.066	1.054	1.078	<0.001
PCP contacts in prior 12 months	1.020	1.004	1.036	0.014
Charlson index	1.344	1.184	1.527	<0.001
Non-compliance/attendance (compliant group)	1.642	1.055	2.554	0.028

Patient-reported adherence to insulin regimen is associated with glycemic control among Japanese patients with T2D

Table 2 – Relative risks (RRs) of good glycemic control in patients with type 2 diabetes treated with insulin.

	RRs of good glycemic control (95% CI) HbA1c < 7.0%			P-value for trend
	Insulin injection adherence			
	Higher	Middle	Lower	
Crude model	1.00	0.76 (0.62–0.94)	0.53 (0.25–1.12)	0.003
Multivariable-adjusted relative risk (model 1) ^a	1.00	0.79 (0.64–0.97)	0.56 (0.27–1.17)	0.008
Multivariable-adjusted relative risk (model 2) ^b	1.00	0.82 (0.67–1.00)	 0.64 (0.31–1.31)	0.029

^a Model 1 was adjusted for age and sex.

^b Model 2 was adjusted for all the variables in model 1 plus the number of insulin injections per day, daily insulin doses, and body-mass index.

The Impact of Treatment Noncompliance on Mortality in T2D

- UK general practice (N=15.984)

Table 2—Number of death events, length of follow-up periods, crude event rates, and crude relative risks

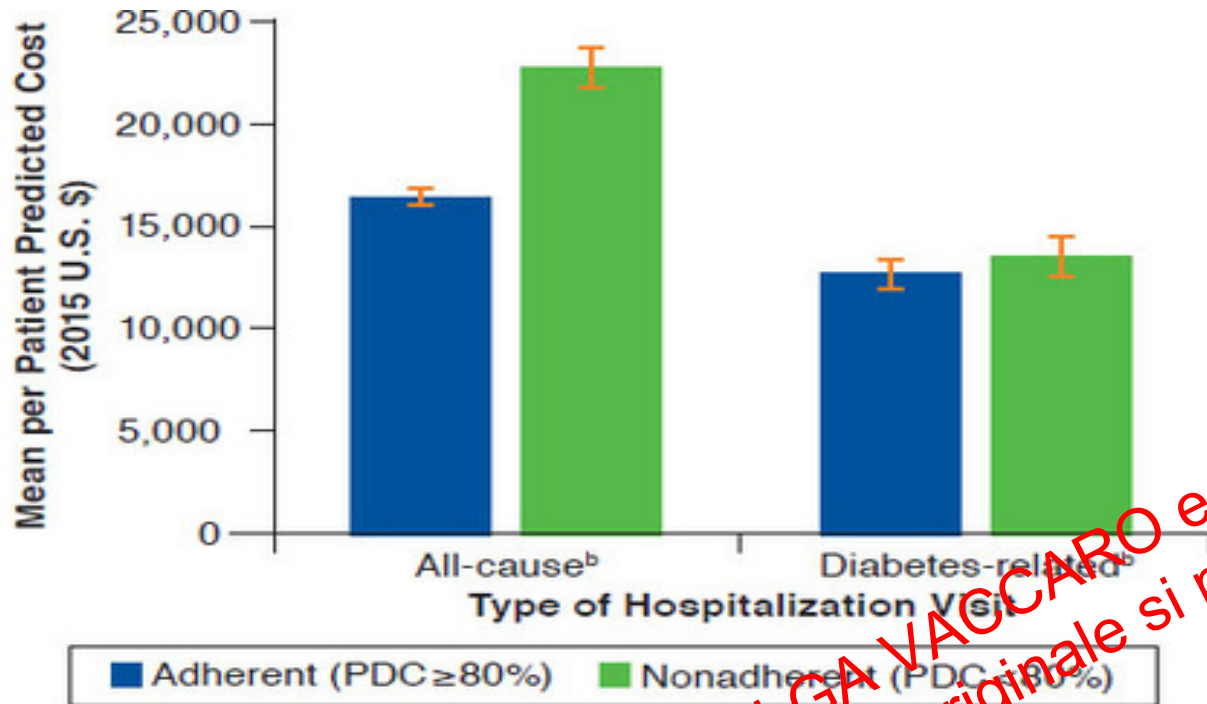
Compliance group	n	Deaths	Follow-up (patient-years)	Mortality rate (per 1,000 patient-years)	Relative risk (95% CI) (reference is compliant)	P
Compliant	9,475	1,546	38,000	40.7		
Diagnosis of medication noncompliance*	705	99	1,870	52.9	1.302 (1.057–1.588)	0.014
Clinic nonattendance**	6,227	821	18,532	44.3	1.089 (1.000–1.169)	0.049
1–2 missed appointments**	4,346	596	13,657	43.6	1.073 (0.976–1.179)	0.1446
>2 missed appointments**	1,881	225	4,875	46.2	1.135 (0.985–1.303)	0.080

*Includes patients in clinic nonattendance rows. **Includes patients in medication noncompliance row.

OAD Medication Adherence and Hospitalization, Mortality, and Healthcare Costs in Adult Ambulatory Care Patients With T2D

	Patients N (%)	Hospitalization						Death		
		All Cause			Diabetes/CVD*/Renal Disease			All Causes		
		N (%)	OR	95% CI	N (%)	OR	95% CI	N (%)	OR	95% CI
Model 1: Level of adherence for the 2-years period										
Adherence	11,800 (29.4)	1456 (12.3)	1.00		319 (2.7)	1.00		86 (0.7)	1.00	
Nonadherence	28,282 (70.6)	3714 (13.1)	1.21	1.13-1.31	769 (2.7)	1.26	1.08-1.47	276 (1.0)	1.28	0.97-1.70
Adherence										
80% <MPR	11,800 (29.4)	1456 (12.3)	1.00		319 (2.7)	1.00		86 (0.7)	1.00	
Nonadherence										
60% ≤MPR <80%	6098 (15.2)	760 (12.5)	1.13	1.03-1.24	174 (2.9)	1.22	1.01-1.47	50 (0.8)	1.33	0.93-1.90
40% ≤MPR <60%	5184 (12.9)	670 (13.0)	1.20	1.08-1.33	149 (2.9)	1.27	1.04-1.56	44 (0.9)	1.25	0.86-1.82
MPR <40%	17,000 (42.4)	2282 (13.4)	1.36	1.23-1.50	437 (2.6)	1.30	1.07-1.59	182 (1.1)	1.26	0.87-1.81
Model 2: Level of adherence for the first year/the second year										
Adherence/adherence	9085 (22.7)	1091 (12.0)	1.00		232 (2.6)	1.00		62 (0.7)	1.00	
Adherence/nonadherence	2987 (7.5)	371 (12.4)	1.12	0.99-1.27	89 (3.0)	1.30	1.01-1.66	30 (1.0)	1.54	0.99-2.40
Nonadherence/adherence	4368 (10.9)	587 (13.4)	1.24	1.11-1.38	134 (3.1)	1.36	1.09-1.69	33 (0.8)	1.28	0.83-1.96
Nonadherence/nonadherence	23,642 (58.9)	3121 (13.2)	1.30	1.19-1.42	624 (2.6)	1.37	1.15-1.64	237 (1.0)	1.40	1.01-1.95

Association of Medication Adherence with Hospital Utilization and Costs Among Elderly with Diabetes Enrolled in a State Pharmaceutical Assistance Program



	All-Cause (n = 1907)	Diabetes-Related (n = 708)
Adherent, mean (95% CI)	\$16,383 (\$16,173-\$16,571)	\$12,659 (\$12,348-\$12,970)
Nonadherent, mean (95% CI)	\$22,697 (\$22,220-\$23,173)	\$13,515 (\$13,060-\$13,969)

^aPredicted costs estimates and corresponding 95% CIs based on generalized linear models, and corresponding P values based on paired t-tests.

^bP < 0.01.

CI = confidence interval; PDC = proportion of days covered.

Medication nonadherence was associated with significantly greater

- all-cause (\$22,670 vs. \$16,383; $P < 0.0001$)
- diabetes-related (\$13,518 vs. \$12,634; $P = 0.0003$) hospitalization costs.

La tecnologia ci aiuta?

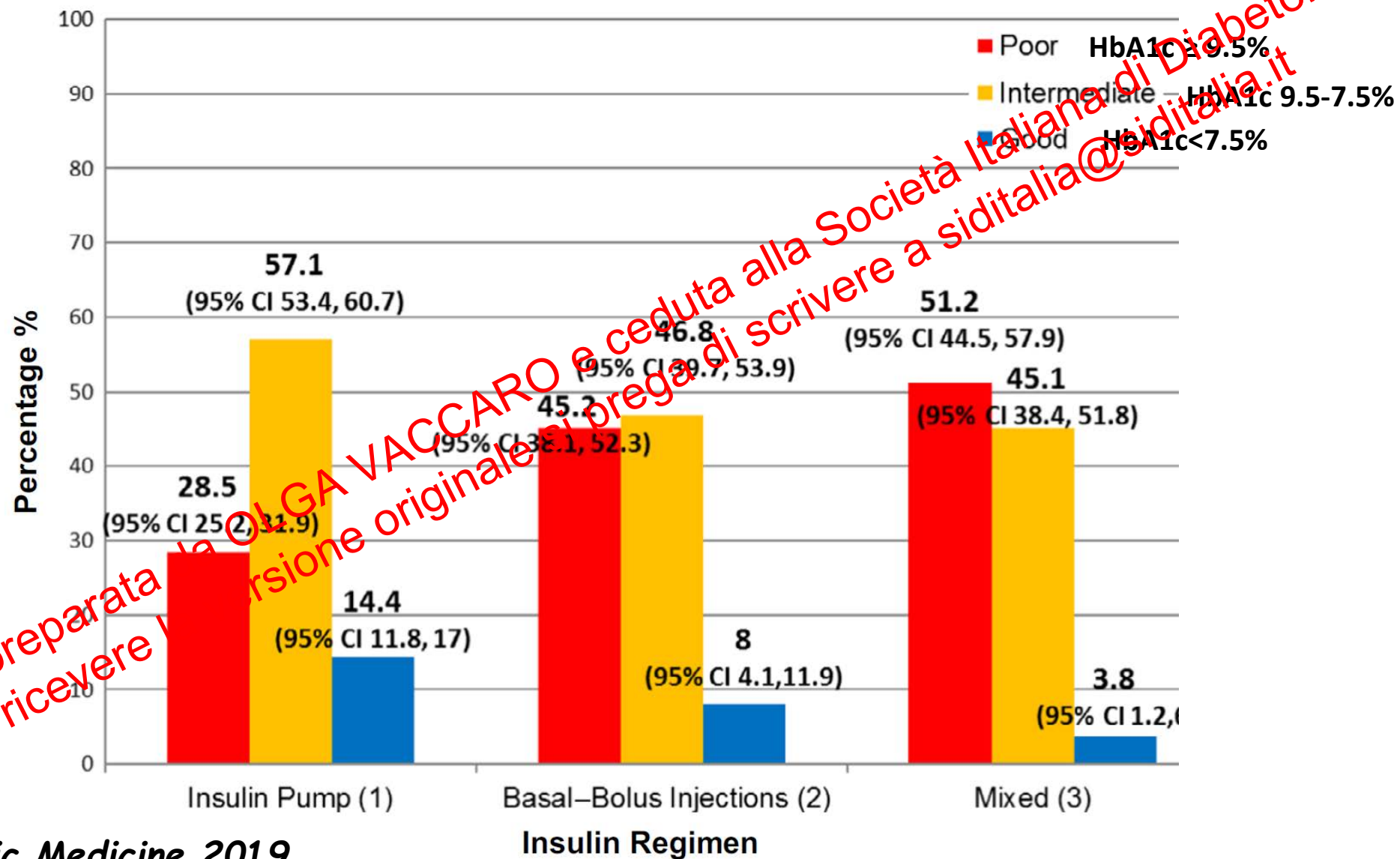
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Real-world factors affecting adherence to insulin therapy in patients with T1D or T2D

Table 3 Adherence in patients initiating therapy with a vial/syringe or a pen device or switching from a vial/syringe to a pen device

Reference and country	Adherence measure (n)	Adherence with vial/syringe	Adherence with pen device	P-value
Initiating insulin therapy				
Buyzman <i>et al.</i> , 2011 [31] USA	Medication possession ratio (1876)	33%	53%	< 0.001
Lee <i>et al.</i> , 2011 [32] USA	Proportion of days covered (4088)	40.2%	54.6%	< 0.001
Pawaskar <i>et al.</i> , 2007 [34] USA	Medication possession ratio (1330)	50%	53%	
Switching from a vial/syringe to a pen device				
Baser <i>et al.</i> , 2010 [30] USA	Medication possession ratio (1064)	13%*	22%	< 0.001
Lee <i>et al.</i> , 2006 [33] USA	Medication possession ratio (1156)	62%†	69%	< 0.01
Pawaskar <i>et al.</i> , 2007 [34] USA	Medication possession ratio (1120)	56%*	45%	< 0.05
	Insulin therapy All medication	90%*	92%	< 0.05

Glucose control by insulin regimen group in children with T1D



Clinical correlates of poor glycaemic control within insulin regimens among children with T1D

Factor	1 Insulin pump N=596 (171 events)	
	Adjusted OR (95% CI)*	P
Diabetes duration (years) [†]	1.1 (0.97, 1.24)	0.1594
Non-white race/ethnicity (Referent: Non-Hispanic White)	2.7 (1.50, 5.12)	0.0008
Female sex (Referent: Male)	1.1 (0.69, 1.66)	0.7502
Age at cohort study visit [†]	1.1 (0.99, 1.22)	0.0634
Number of households living in ≥ 2 (Referent: Living in 1 household)	1.8 (1.05, 3.08)	0.0331
Medicaid/Medicare Insurance (Referent: Private insurance)	2.0 (1.19, 3.38)	0.0090
Number of times missed insulin		<0.0001
1–5/week vs <1/week	4.0 (2.40, 6.75)	<0.0001
1+/day vs <1/week	2.4 (1.27, 4.73)	0.0075
Family conflict survey (parent report) [‡]	1.1 (1.05, 1.15)	<0.0001
Low blood sugar survey (parent report) [‡]	0.97 (0.95, 0.99)	0.0004
Eating problem survey [‡]	1.0 (0.99, 1.04)	0.2609
Problem not receiving care (access barrier; Referent: No problem receiving care)	0.9 (0.32, 2.28)	0.7476
Problem not spending enough time with provider (process barrier; Referent: No problem spending enough time with provider)	1.3 (0.85, 2.11)	0.2136

Una ridotta aderenza terapeutica comporta:

- Un peggioramento del compenso metabolico
- Un aumentato rischio di complicanze
- Un aumento delle ospedalizzazioni
- Un aumento della mortalità
- Una riduzione della qualità di vita
- Un aumento dei costi sanitari e sociali

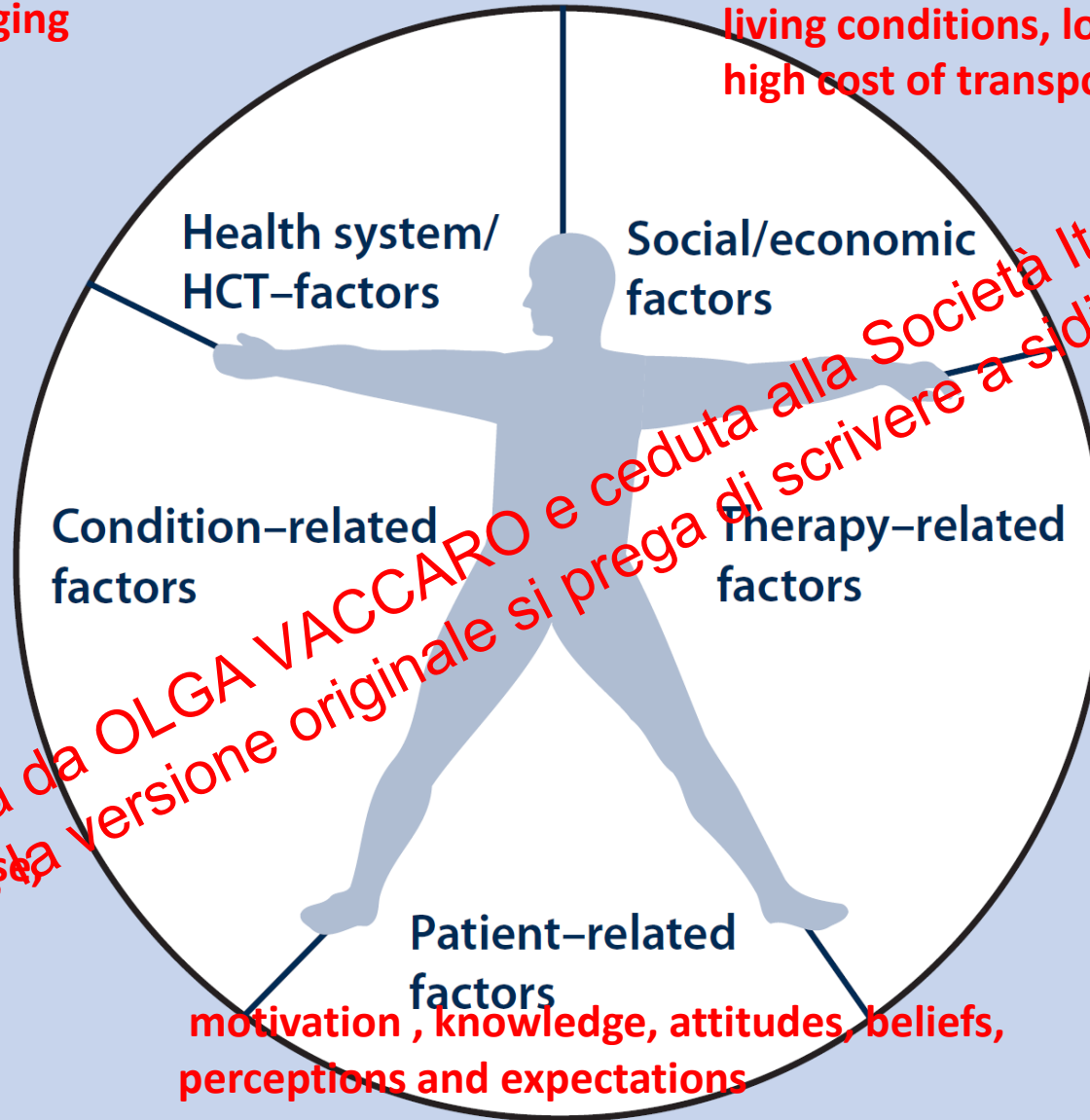
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Come si può migliorare l'aderenza terapeutica

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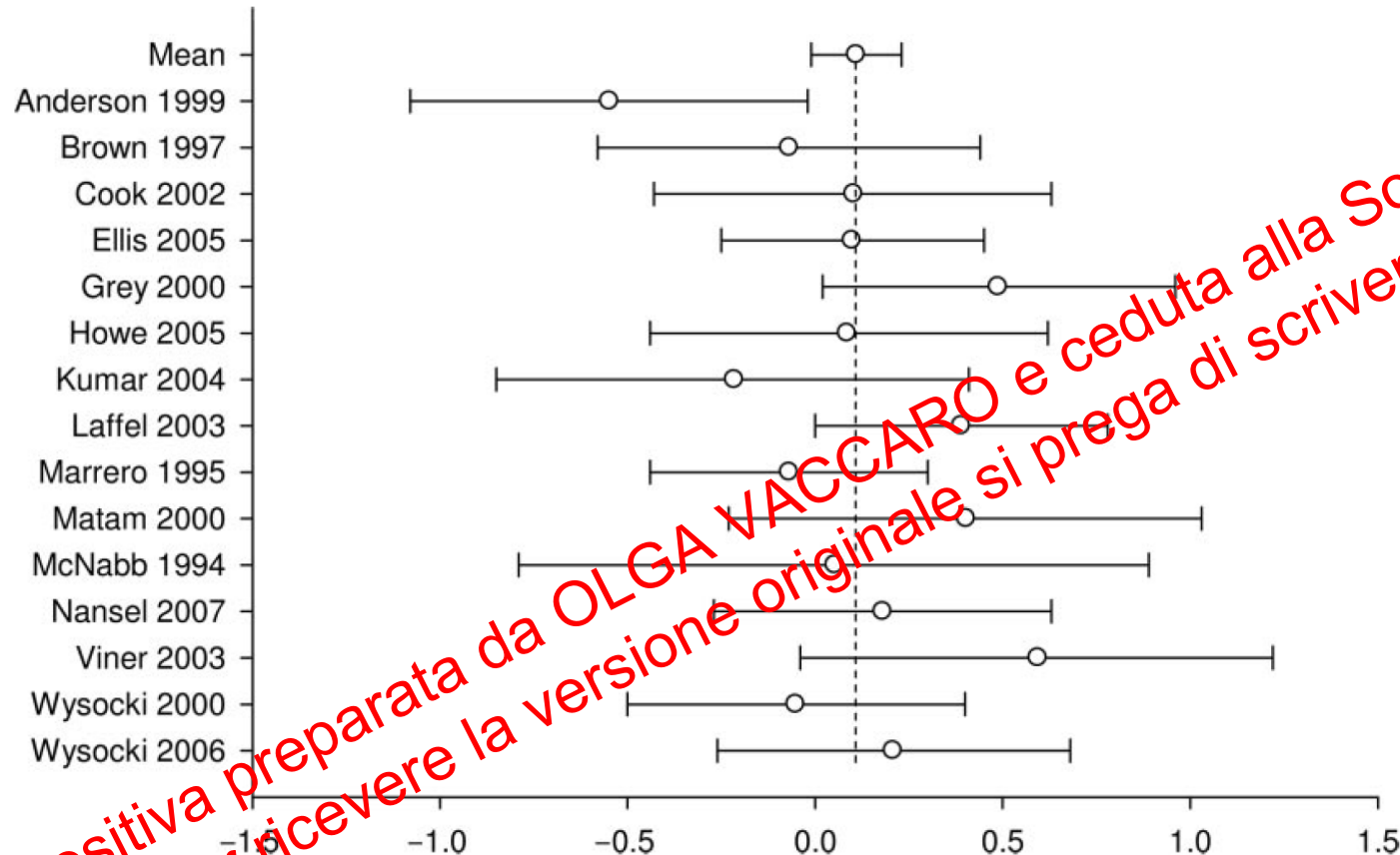
poorly developed health services
lack of knowledge and training for
health care providers on managing
chronic diseases,
short consultations,
weak capacity of the system to
educate patients and establish
self-management capacity,
lack of knowledge on effective
interventions for improving
adherence

poor socioeconomic status, low level of education,
lack of effective support network, unstable
living conditions, long distance from treatment centre,
high cost of transport, high cost of medication



HCT, Health-car

Interventions With Adherence-Promoting Components in Pediatric T1D



- Direct interventions focused entirely on direct, behavioral processes.
- Combined interventions focused on one or several behavioral tasks, but the emphasis of the intervention was on promoting coping or problem-solving skills or a family process involved in diabetes management.

Interventions to improve patients' compliance in type 1 diabetes: systematic review and meta-analyses of randomized controlled clinical trials

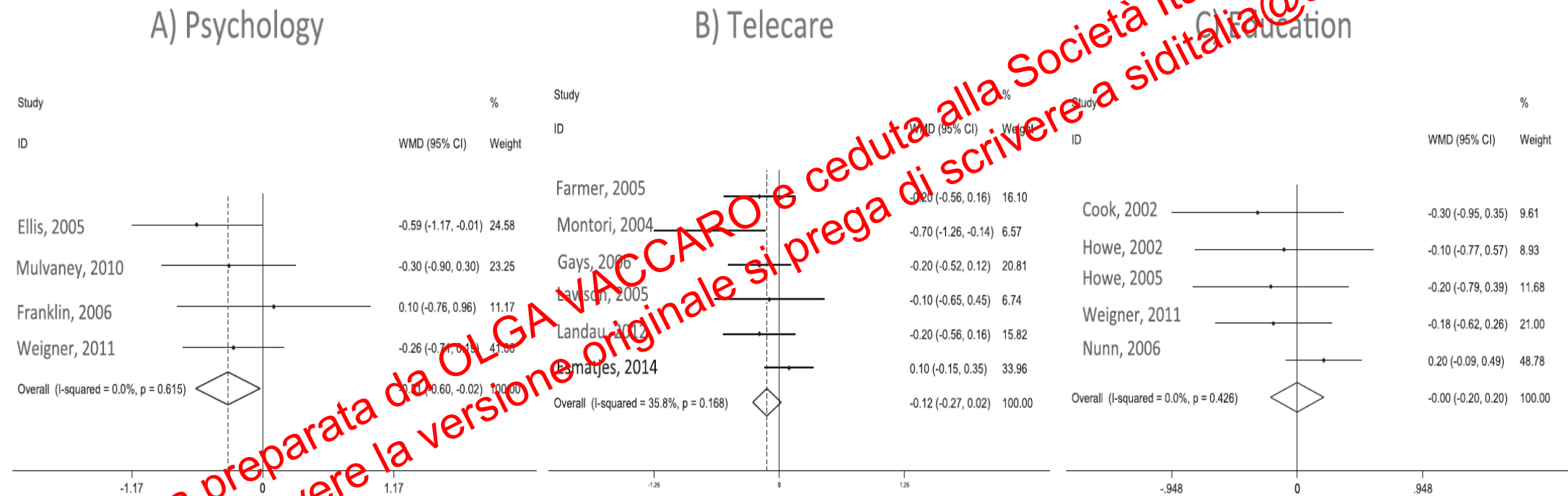
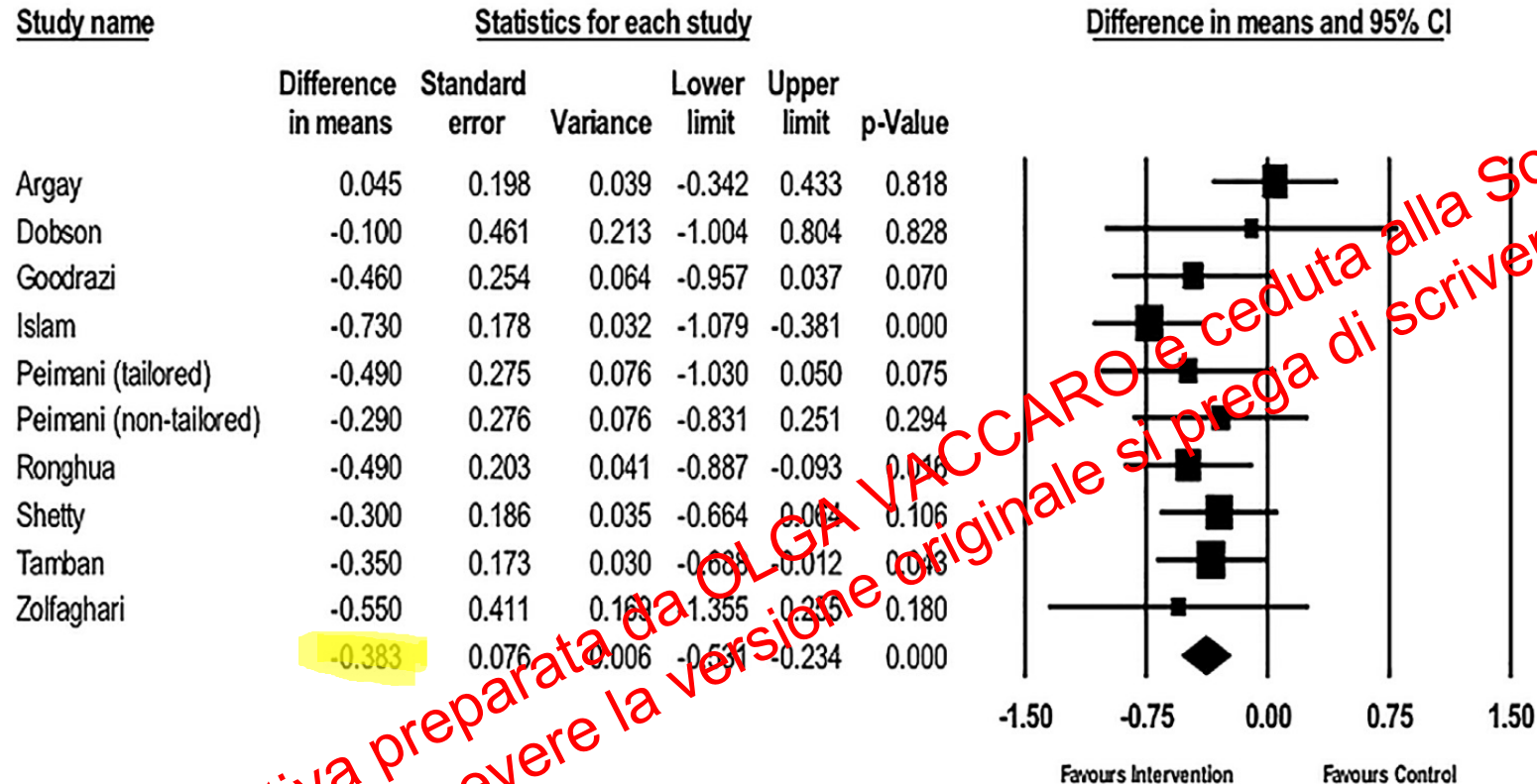


Fig. 2 Forest plots of interventions to improve compliance with lower glycated hemoglobin (HbA1c) in patients with type 1 diabetes: **a** Psychological. **b** Telecare. **c** Education categories

Mobile phone text messaging in improving glycaemic control for patients with T2D



Text messages and microletters with the content of the messages focussing primarily on diet, exercise, self monitoring of blood sugar levels and cardiovascular risk factor reduction.

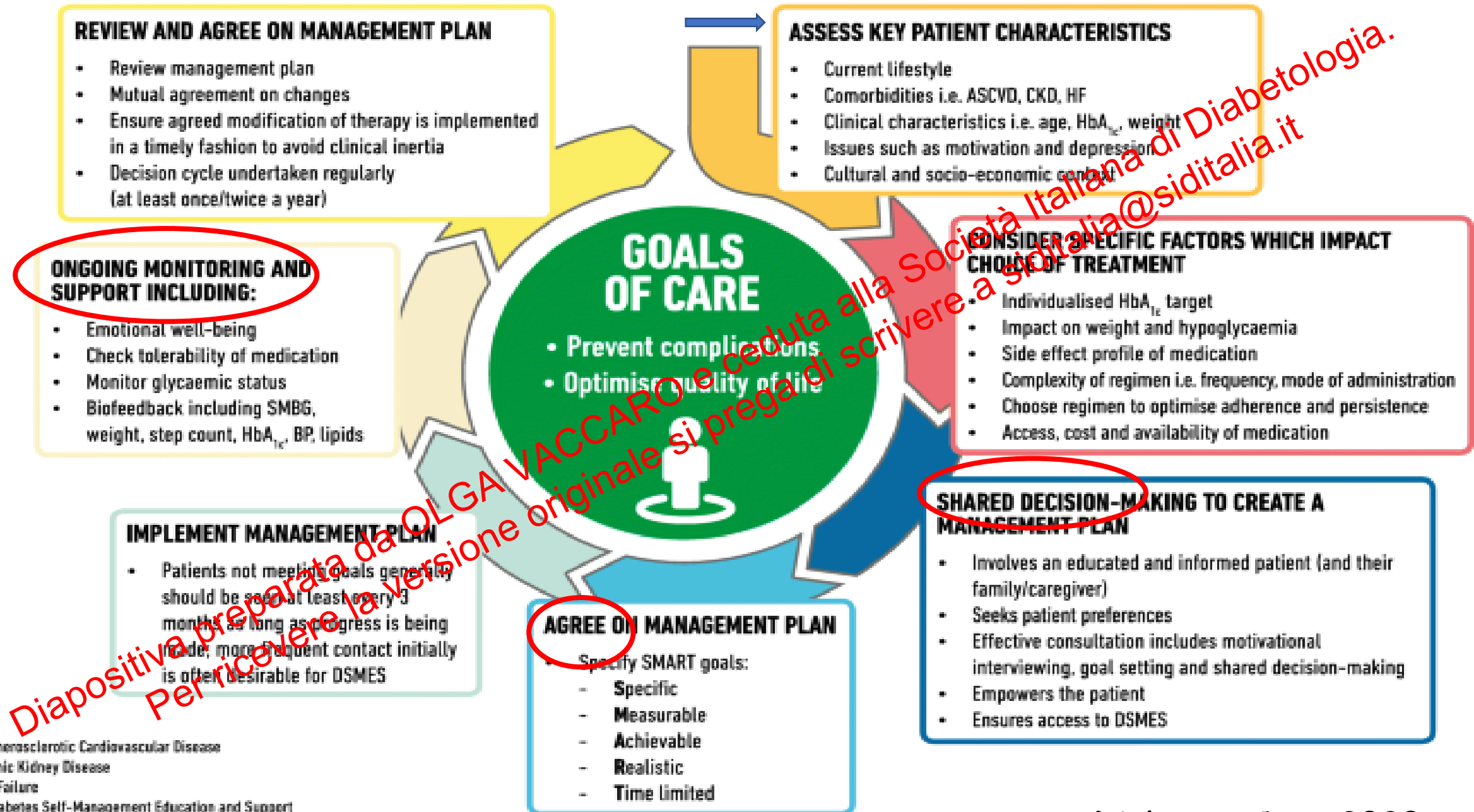
Blood Glucose Control During Lockdown for COVID-19: CGM Metrics in Italian Adults With Type 1 Diabetes

Table 1—CGM metrics before and during lockdown in the study participants

CGM metrics (n = 207)	Before lockdown	During lockdown	P value*
CGM use (%)	91.2 ± 9.1	90.1 ± 8.6	0.081
Mean glucose (mmol/L)	9.6 ± 2.0	9.5 ± 1.9	0.165
Estimated HbA _{1c} (%)	7.7 ± 1.3	7.6 ± 1.1	0.098
Estimated HbA _{1c} (mmol/mol)	60 ± 10	59 ± 9	0.098
TAR (%)			
>180 mg/dL (10.0 mmol/L)	26.8 ± 11.2	26.3 ± 11.2	0.414
>250 mg/dL (13.9 mmol/L)	14.7 ± 15.3	13.2 ± 13.7	0.052
→ TIR (%)	55.6 ± 17.6	58.2 ± 18.1	0.002
TBR (%)			
<70 mg/dL (3.9 mmol/L)	2.95 ± 3.05	2.71 ± 3.08	0.192
<54 mg/dL (3.0 mmol/L)	1.42 ± 2.39	0.58 ± 1.17	<0.001
→ Glycemic variability (CV%)	35.9 ± 7.0	34.7 ± 6.3	0.001

Data are expressed as mean ± SD. *Paired sample *t* test.

DECISION CYCLE FOR PATIENT-CENTRED GLYCAEMIC MANAGEMENT IN TYPE 2 DIABETES



ASCVD = Atherosclerotic Cardiovascular Disease

CKD = Chronic Kidney Disease

HF = Heart Failure

DSMES = Diabetes Self-Management Education and Support

SMBG = Self-Monitored Blood Glucose

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