GESTIONE DELLA TERAPIA TIPO 1
NELLA TRANSIZIONE
DALL'ADOLESCENTE ALL'ADULTO

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

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La dr.ssa Giuseppina Russo dichiara di aver ricevuto negli ultimi due anni compensi o finanziamenti dalle seguenti Aziende Farmaceutiche e/o Diagnostiche:

- Boehringer Ingelheim

-Eli-Lilly

-Novo-Nordisk-

-Astra Zeneca

-Merck SD

- Sanofi

Dichiara altresì il proprio impegno ad astenersi, nell'ambito dell'evento, dal nominare, in qualsivoglia modo o forma, aziende farmaceutiche e/o denominazione commerciale e di non fare pubblicità di qualsiasi tipo relativamente a specifici prodotti di interesse sanitario (farmaci, strumenti, dispositivi medico-chirurgici, ecc.).

Glucose control in type 1 diabetes

The importance of glycemic control

- The importance of glucose control in the prevention of complications in patients with DM is well recognized[1–3]
- As such, management guidelines recommend specific targets for glycemic control
- ADA/EASD, ADA, AACE and IDF guidelines advocate individualization of glycemic targets based on patient characteristics[4–8]

1. Stratton IM, et al. BMJ 2000;321:405-412; 2. UKPDS 33. Lancet 1998;352:837-53; 3. Holman RR et al. N Engl J Med 2008;359:1577-89;
4. Inzucchi SE et al. Diabetes Care. 2012;35:1364-1379; 5. ADA. Diabetes Care. 2014;37 Suppl 1:S14-80; 6. Inzucchi SE et al. Diabetes Care. 2012;35:1364-1379;
7. Garber AJ et al. Endocr Pract. 2013;19:327-336; 8. IDF Global Guidelines for Type 2 Diabetes. Available at: http://www.idf.org/webdata/docs/IDF%20GGT2D.pdf. Accessed August 2014

Most patients with DM1 have HbA1c values above recommended targets

% subjects with HbA1c >7%

- USA 77% , 2016 (*McCartthy Nurs Res 2016*)
- Spain 74%, 2012 (*Sastre J, Endocrinologia y Nutricion 2012*)
- Venezuela 90%, 2010 (*Moreira ED, Diabetes Res Clin Pract 2010*)
- Brazil 89.6%, 2010 -2017 (Mendes AB, Acta Diabetol 2010; Andreade CS, BMJ Open 2017)

Table 1 Mean glycated hemoglobin (HbA1c) and percentage of patients with type 1 diabetes who are on glycemic target in Brazilian centers

Author	Number	Region of Brazil	HbA1c (%) (mean ± SD)	Percentage of patients on glycemic target*
Rodrigues et al. 2010 [10][a]	573	South	9.0 ± 3.9	22.0 %
Mendes et al. 2010 [49][b]	979	South, Southeast, Northeast, Middle-west	-	7.0 %
Gomes et al. 2012 [50][c]	3591	South, Southeast, North/Northeast, Middle-west	9.1 ± 2.3 to 9.4 ± 2.6	12.2 to 21.4 %
Gomes et al. 2012 [51][d]	1774	South, Southeast, North/Northeast, Middle-west	9.1 ± 2.2	11.6 %
Viana et al. 2013 [52][e]	1026	South, Southeast, North/Northeast, Middle-west	9.3 ± 2.3	13.0 %

*Glycemic targets: [a, b, e] HbA1c <7.0 %; [c, d] HbA1c <7 % – adults, HbA1c <7.5 % – 13 to 19 years, HbA1c < 8 % – 6 to 12 years. HbA1c >7.5 % and HbA1c <8.5 % – < 6 years

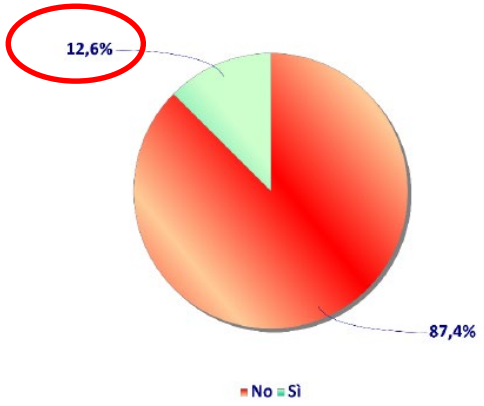
Viana *et al. Trials* (2016) 17:94

28.538 pazienti con DM1
Età media 46,8 anni
45,7% donne
Durata diabete media 19,9 anni

Soggetti con almeno una determinazione dell'HbA1c (%)

Il 97,7% dei pazienti con DM1 ha avuto almeno una determinazione dell'HbA1c nel corso del 2016.

Pazienti trattati con microinfusore di insulina (%)



Tra i soggetti con DM1 inclusi in questa analisi, il 12,6% (N=3583) risulta in trattamento con microinfusore di insulina.

Livelli di HbA1c nei pazienti con DM1 afferenti ai servizi di diabetologia in Italia

Livelli medi dell'HbA1c (%)

	HbA1c (%)
Tutti	7,8±1,3

I livelli medi di glicata sono risultati pari 7,8%. La deviazione standard di oltre un punto denota la variabilità della misura.

Andamento per 8 classi dell'HbA1c (%)

Il grafico mostra che circa il 30% dei pazienti si distribuisce nelle classi di HbA1c ≤ 7,0%, ma rileva anche un'ampia eterogeneità nella distribuzione dei valori di HbA1c della popolazione, con percentuali non trascurabili di pazienti con valori particolarmente elevati.

Soggetti con HbA1c ≤ 7,0%

Meno di un paziente su tre con DM1 presenta livelli di HbA1c inferiori o uguali a 7,0%.

Andamento dei valori di HbA1c in pazienti con DM1 in bas eal tipo di trattamento

Indicatori di esito intermedio

	MDI	CSII
Soggetti con HbA1c ≤ 7,0%	27,6	32,9
Soggetti con HbA1c ≥ 8,0%	37,7	29,5
Soggetti con colesterolo LDL < 100 mg/dl	49,5	48,7
Soggetti con colesterolo LDL ≥ 130 mg/dl	16,9	16,3
Soggetti con pressione arteriosa ≥ 140/90 mmHg	28,7	20,9
Soggetti con BMI ≥ 30 Kg/m^2	12,4	11,8
Soggetti con micro/macroalbuminuria (%)	26,9	20,9
Soggetti con eGFR <60 mg/dl*1.73 m^2 (%)	7,8	5,3
Soggetti fumatori (%)	26,7	23,3

Effective insulin therapy include four critical accomplishments:

- Initiation
- ***Adherence***
- Persistence
- Intensification

Each step requires the involvment of both patient and health care provider. Unfortunately there may be failures at each juncture.

Peyrot M, *Patient Prefer Adherence* 2011; 5:255-265

Adherence : *what are we measuring*?

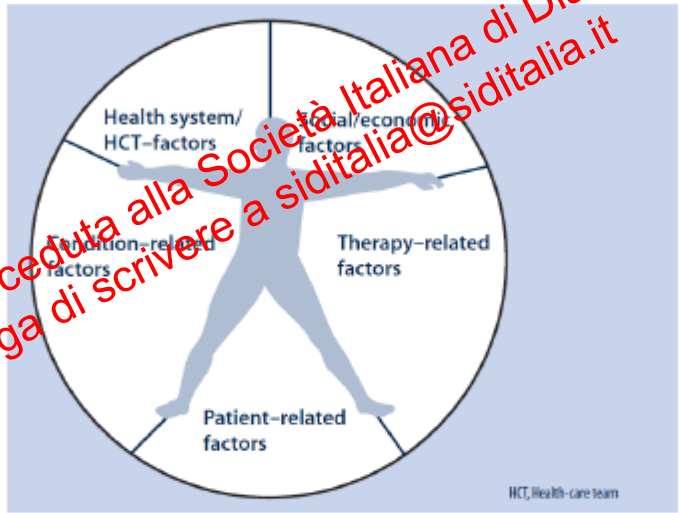
Aderenza terapeutica: definizione

- Secondo l'Organizzazione Mondiale della Sanità l'aderenza terapeutica è definibile come ***"il grado di effettiva coincidenza tra il comportamento individuale del paziente e le prescrizioni terapeutiche ricevute dal personale sanitario curante"***
- Questo concetto si riferisce tanto alle prescrizioni farmacologiche, che alle indicazioni relative alla dieta ed allo stile di vita.
- E' un ***importante modificatore dell'efficacia dei sistemi sanitari.***

L'ADERENZA ALLA TERAPIA

Il problema può essere affrontato valutando il punto di vista del:

- Paziente
- Medico
- Società



Le 5 dimensioni dell'aderenza

1. Fattori sociali ed economici
2. Fattori legati al Sistema Sanitario
3. Fattori relativi alla terapia
4. Fattori relativi alla condizione clinica
5. Fattori relativi al Paziente

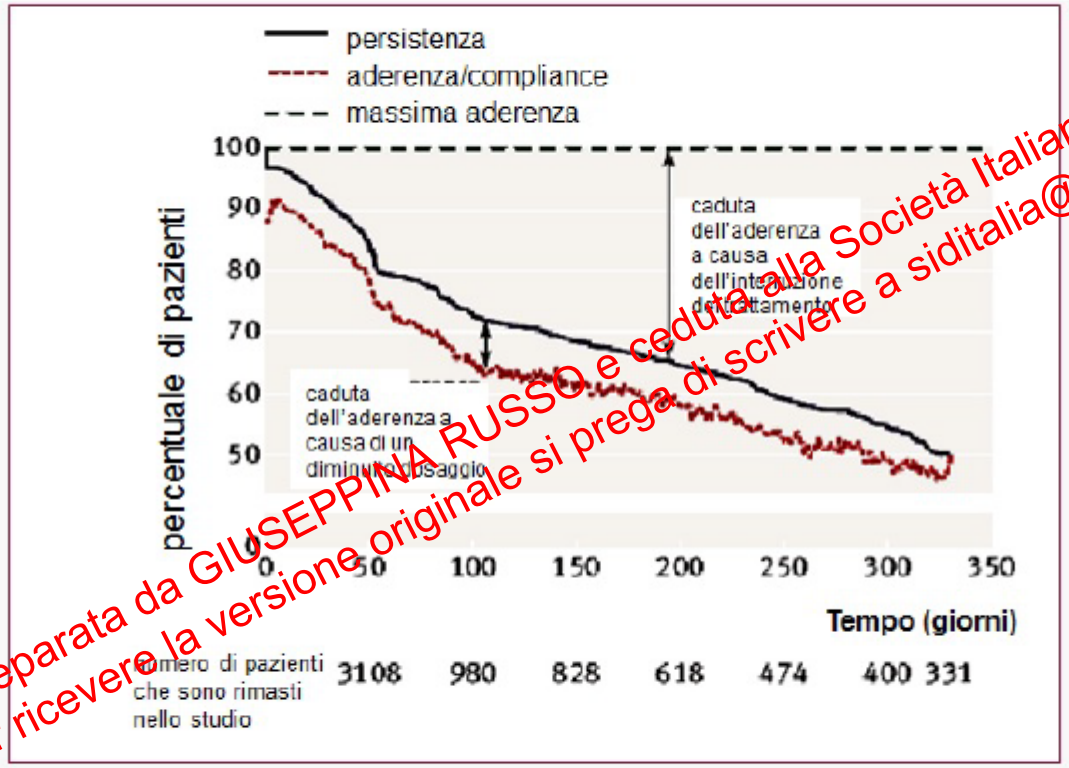
Società

Medico

Paziente

Aderence to Long-term therapies - Evidence for action. *World Health Organization*; 2003.

Andamento temporale di aderenza, compliance e persistenza



A distanza di un anno meno della metà dei pazienti continua la terapia e meno della metà ha una buona aderenza

BMJ 2008;336;1114-1117; 14 May 2008;

La non-aderenza a diverse terapie aumenta la mortalità

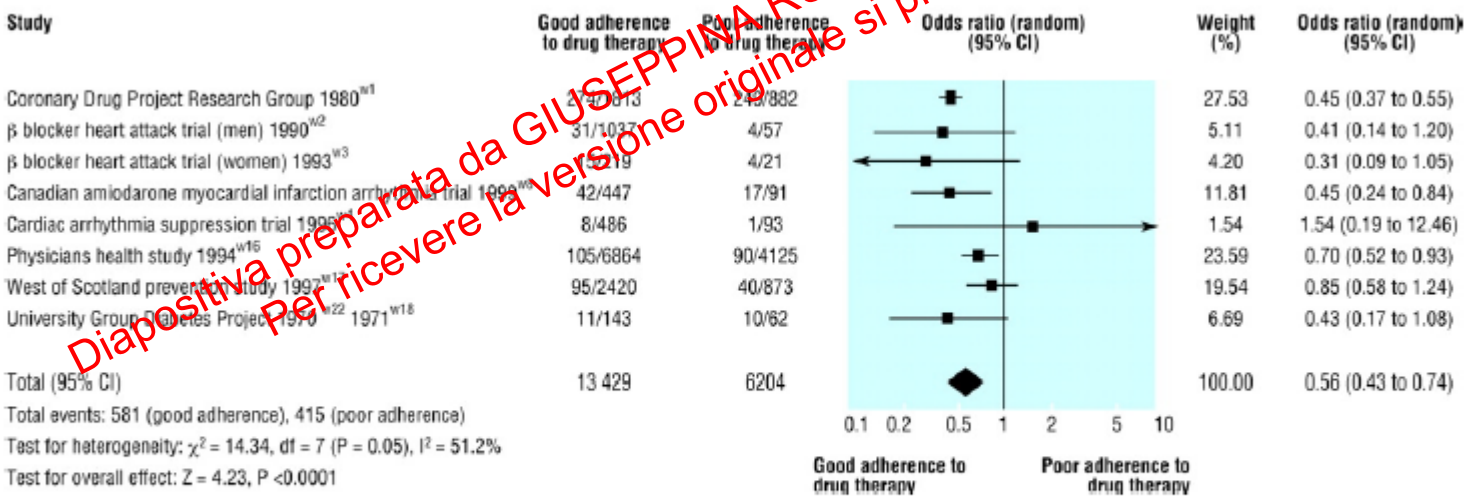
Cite this article as: BMJ, doi:10.1136/bmj.38875.675486.55 (published 21 June 2006)

Research

BMJ

A meta-analysis of the association between adherence to drug therapy and mortality

Scot H Simpson, Dean T Eurich, Sumit R Majumdar, Rajdeep S Padwal, Ross T Tsuyuki, Horace Varney, Jeffrey A Johnson



BMJ Open **Systematic review of adherence rates by medication class in type 2 diabetes: a study protocol**

Andrew McGovern, Zayd Tippu, William Hinton, Neil Munro, Martin Whyte, Simon de Lusignan

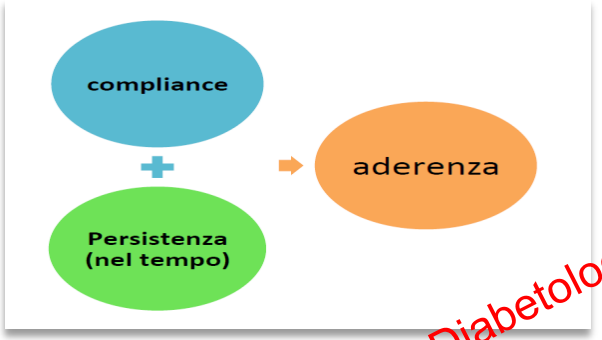
In the real world, patient adherence and persistence determines medication effectiveness

Secondo l'OMS **"Aumentare l'efficacia di adesione alla terapia potrebbe avere un impatto molto maggiore sulla salute della popolazione di qualsiasi miglioramento medico specifico"**

Una ridotta aderenza 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

Come si misura l'aderenza……



Aderenza terapeutica = *persistenza + compliance* all'assunzione del farmaco

Persistenza = *continuità nell'assunzione* del farmaco da parte del paziente (misurata come tempo dall'inizio del trattamento al suo completamento o interruzione)

Compliance = *intensità del trattamento* farmacologico o grado di adesione di un paziente all'assunzione del farmaco, cioè misura in cui un paziente osserva un regime terapeutico e tutte le dosi farmacologiche associate, quantificata secondo i seguenti metodi:

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%

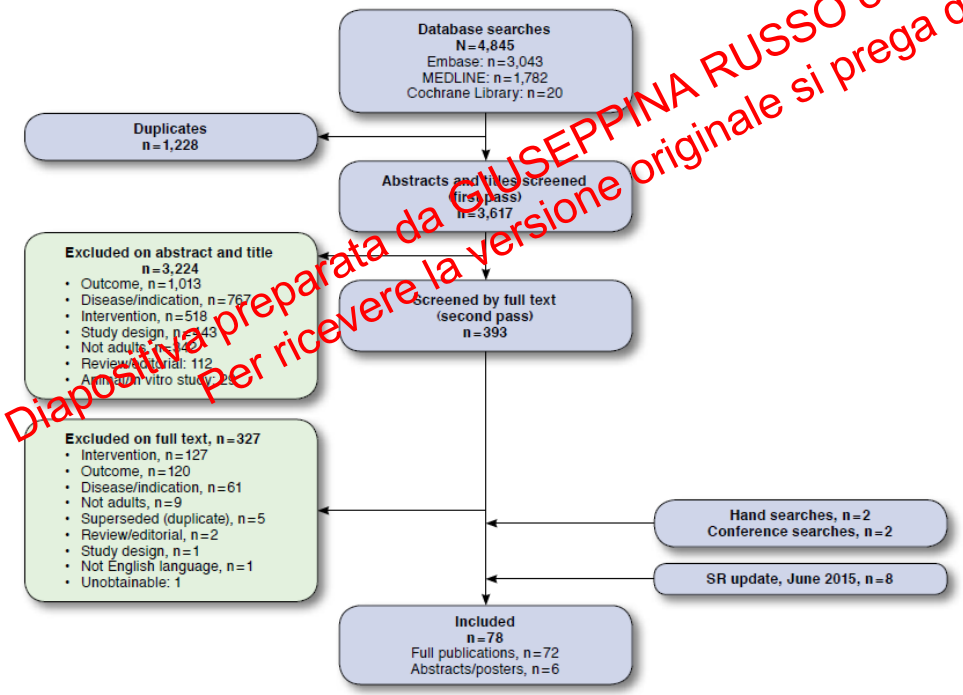
WHO. World Health Organ Tech Rep Ser. 2003;921:1-164.

SYSTEMATIC REVIEW

A Systematic Review of Insulin Adherence Measures in Patients with Diabetes

Samuel Stolpe, PharmD; Michel A. Kroes, MSc; Neil Webb, BSc Hons; and Tami Wisniewski, MPH

FIGURE 1 Flow Diagram of Included Studies



SR = systematic review.

- La maggior parte degli studi su DM2
- Solo 2 con DM1 e 10 con DM1+DM2
- Retrospective claim cohorts
- Time period 1 year

- This article provides an overview and critique of methods used to measure adherence to insulin in the context of development of quality measures in the United States.
- While there is some potential based on previously developed methods to measure insulin adherence, without additional research, none of the identified methods are currently appropriate for use as a quality measure for insulin adherence.

TABLE 3 Most Commonly Reported Adherence Measures

Adherence Measures	Calculation Method	Number of References Using This Measure	Areas of Divergence	Adherence Measure Advantages and Disadvantages
Medication possession ratio	Using prescription data from pharmacy claims MPR = Total days supply of all prescriptions in defined period / Number of days in the defined period Value between 0 and 1, 1 being 100% adherent Patients are usually considered adherent at an MPR ≥ 0.8 (80%).[18]	n = 22[16-37]	Denominator as number of days from first fill until last fill or 1 year or otherwise modified (e.g., excluding days hospitalized or overlap in fills)	**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
Adjusted medication possession ratio method	Using prescription data from pharmacy claims Adjusted MPR = MPR × Average days between prescription refills / Average days supply Used to account for the differences in pack sizes between insulin devices	n = 11[30,31,35-43]	Correct the issue that almost all prescriptions are dispensed with a 30-day supply period even though patients may have more insulin than ordered due to variations in their daily dosing (dependent on body weight and glycemic control).[35]	**Advantages:** • Uses pharmacy claims data • Ability to adjust for differences in insulin pack sizes and correct for prescriptions dispensed with 30-day supply period **Disadvantages:** • Pharmacy claims data affected by wastage and stockpiling • Adjustment factor not standardized • Relies on days supply in calculation
Proportion of days covered	Using prescription data from pharmacy claims PDC = Days supplied between first and last prescription / Days between first fill and end of the measurement period Patients are usually defined as adherent if they have a PDC ≥ 80%.[65] Endorsed by the PQA as the preferred method for measuring medication adherence[44]	n = 10[44-53]	Can adjust for overlapping prescriptions, different types of medication and adjust for proportion of days spent in hospital. When calculating the PDC for a single drug, it can be considered the same as the MPR [illegible] sure that is calculated using the [illegible] analysis periods like denomi[illegible] [illegible]n if the MPR is capped at 1.0	**Advantages:** • Uses pharmacy claims data • Method endorsed by the PQA as preferred method for measuring adherence • Accounts for overlap in days supply • More accurate when calculating adherence to medication regimens **Disadvantages:** • Does not account for differences in insulin pack size • Pharmacy claims data affected by wastage and stockpiling • Relies on days supply in calculation
Persistence	Using prescription data from pharmacy claims: Patient remaining on the study drug for the entire follow-up period without discontinuation or switching after initiation of the index drug	n = 24[11,17,24,30,31,35-37,39-43,54-64]	Time between refills (gaps) and proportion of patients not refilling in time	**Advantages:** • Uses pharmacy claims data • Assesses treatment discontinuation **Disadvantages:** • Pharmacy claims data affected by wastage and stockpiling • Measure indicates patient is persistent but does not measure compliance with physician's recommendations • A predefined treatment gap is not suitable for measuring persistence with injectables due to variable-dose titration schedules
Daily average consumption	Using prescription data from pharmacy claims DACON = Total number of units dispensed / Number of days between index date and date of last fill) where Total units dispensed = total milliliters dispensed for all prescriptions in follow-up period × 100 No benchmark exists for DACON representing good adherence.	n = 12[30,31,36-39,41-43,56,60,64]	Can adjust for units dispensed and can account for type of insulin administered when interpreting results	**Advantages:** • Uses pharmacy claims data • Accounts for differences in insulin pack size • Easily calculated • Avoids use of days supply **Disadvantages:** • No validated threshold for good adherence • Pharmacy claims data affected by wastage and stockpiling • Inter- and intrapersonal variability could confound results in large datasets

TABLE 3 Most Commonly Reported Adherence Measures *(continued)*

Adherence Measures	Calculation Method	Number of References Using This Measure	Areas of Divergence	Adherence Measure Advantages and Disadvantages
Morisky Medication Adherence Scale	Patient self-report measures with 4 or 8 items that can be scored as either yes (0) or no (1) MMAS-4 scores: 0 = high adherence; 1-2 = medium adherence; 3-4 = low adherence MMAS-8 scores: 0 = high adherence; 1-2 = medium adherence; 3-8 = low adherence[66]	MMAS-4 n = 6[67-72] and MMAS-8 n = 3[73-75]	Not applicable	**Advantages:** • Can be used to gather information on reasons for nonadherence • Self-reported surveys often increase compliance, as the individuals know they are being observed **Disadvantages:** • Self-report measure where patients may [illegible] • Complexity and cost of data collection when implementing as a quality measure

DACON = daily average consumption; MMAS = Morisky Medication Adherence Scale; MPR = medication possession ratio; PDC = proportion of days covered; PQA = Pharmacy Quality Alliance.

Pro e cons dei metodi "indiretti" per misurare l'aderenza alla terapia insulinica

Adherence in type 1 diabetes

Clinical Care/Education/Nutrition/Psychosocial Research
ORIGINAL ARTICLE

Correlates of Insulin Injection Omission

MARK PEYROT, PHD[1,2]
RICHARD R. RUBIN, PHD, CDE[2,3]
DAVIDA F. KRUGER, MSN, APN-BC, BC-ADM
LUTHER B. TRAVIS, MD, FAAP[5]

Internet survey 502 US adults on insulin (DM1 e DM2)

AIM: to evaluate rate and factors associated With insulin omission

How often do you skip insulin injection That you know you should take?

57% omitted insulin intentionally
20% omitted insulin frequently

Table 2—*Multiple regression analysis of frequency 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	0.371
*	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

*Reference category = male. †Reference category = nonwhite. ‡Reference category = no college. §Reference category = other not employed. ‖Reference category = type 1 diabetes. ¶Reference category = primary care physician. #Reference category = use syringe.

Diabetes Care 33:240–245, 2010

Diabetes, Obesity and Metabolism 14: 1081–1087, 2012.

Factors associated with injection omission/non-adherence in the Global Attitudes of Patients and Physicians in Insulin Therapy study

ORIGINAL ARTICLE

M. Peyrot[1], A. H. Barnett[2], L. F. Meneghini[3] & P.-M. Schumm-Draeger[4]

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[2] Division of Clinical and Experimental Medicine, University of Birmingham and Diabetes Centre, Heart of England NHS Foundation Trust, Birmingham, UK
[3] Department of Medicine, University of Miami Miller School of Medicine, Miami, FL, USA
[4] Department of Internal Medicine, Bogenhausen Academic Teaching Hospital, Munich, Germany

Table 2. Unadjusted insulin omission/non-adherence rates by country

Country	≥1 Day of insulin omission/ non-adherence per month (N = 1530)	# Days of insulin omission/ non-adherence per month (N = 1530)	# Days of insulin omission/ non-adherence per month among non-adherers (N = 530)
China	33.5%	1.35	4.03
France	19.9%	0.62	3.13
Germany	39.7%	0.74	1.87
Japan	44.0%	1.29	2.94
Spain	22.8%	0.84	3.67
Turkey	23.9%	1.36	5.71
UK	41.5%	1.18	2.84
USA	42.0%	1.56	3.71
Overall	34.6%	1.18	3.41

Multinational survey on 1530 subjects on insulin therapy

Mean age 60 yrs, >9 yrs insulin, 15 yrs diabetes duration

35% non adherent (differences in different Countries)

Diabetes, Obesity and Metabolism 14: 1081–1087, 2012.

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M. Peyrot[1], A. H. Barnett[2], L. F. Meneghini[3] & P.-M. Sch

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[3]Department of Medicine, University of Miami Miller School of Medicine, Miami, FL, USA
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Diversi fattori associati a mancanza di aderenza

Table 3. Correlates of insulin omission/non-adherence days per month (N = 1530).

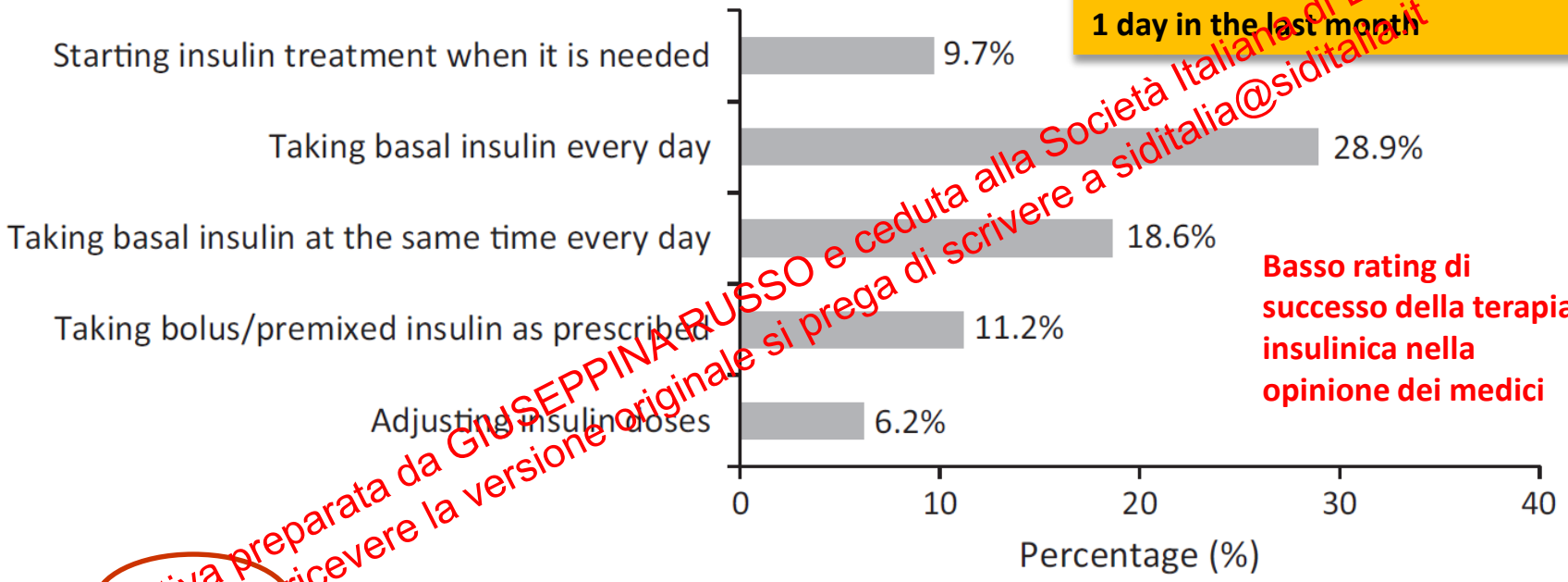
Measures	Coefficient†
National and demographic factors	
Country (reference = USA)	
China	−0.21***
France	−0.19***
Germany	−0.08**
Japan	−0.07*
Spain	−0.14***
Turkey	−0.16***
UK	−0.04
Female (reference = male)	−0.06**
Age (years)	−0.14***
Clinical and disease factors	
Type 2 diabetes	+0.06*
Duration of diabetes (years)	+0.04
Duration of insulin treatment (years)	−0.07
Insulin delivery system (reference = pen only)	
Syringe	−0.04
Other	+0.04
SMBG frequency	−0.02
Hypoglycaemia frequency (days/year)	+0.06*
Psychosocial and behavioural factors	
Non-medication regimen adherence	−0.12***
Insulin regimen adherence perceived as important	−0.05*
Injections perceived as painful	+0.01
Injections perceived to affect lifestyle	+0.06*
Injection difficulty	+0.07*
Barriers to insulin adherence	+0.10***
Satisfaction with ability to choose when to take injections	−0.07**

*p < 0.05; **p < 0.01; ***p < 0.001.
†Standardized regression coefficients from a single model including all variables listed.

Insulin adherence behaviours and barriers in the multinational Global Attitudes of Patients and Physicians in Insulin Therapy study

M. Peyrot[1,2], A. H. Barnett[3], L. F. Meneghini[4] and P.-M. Schumm-Draeger[5]

33.2% of patients reported insulin omission/non adherence at least 1 day in the last month



Basso rating di successo della terapia insulinica nella opinione dei medici

FIGURE 1 Physician report: patient success with insulin treatment tasks (n = 1250)*†. *Percentage of physicians reporting that their patients are very successful (vs. somewhat successful, not very successful, not at all successful, 'don't know'). †Specialists and primary care physicians not significantly different for any measure

Internet survey on 1250 physicians and 1530 patients (180 DM1) in China, France, Japan, Germany, Spain, Turkey, UK, USA.

Diabet. Med. 29, 682–689 (2012)

Insulin adherence behaviours and barriers in the multinational Global Attitudes of Patients and Physicians in Insulin Therapy study

M. Peyrot[1,2], A. H. Barnett[3], L. F. Meneghini[4] and P.-M. Schumm-Draeger[5]

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

Reason	Patients % and rank	Physicians % and rank
Too busy	18.9% 1	41.9% 3
Travelling	16.2% 2	43.6% 2
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

Diabet. Med. 29, 682–689 (2012)

Nonostante le barriere per i pazienti gli effetti positivi (*in verde*) superano quelli negativi (*in rosso*) su diversi aspetti della vita quotidiana

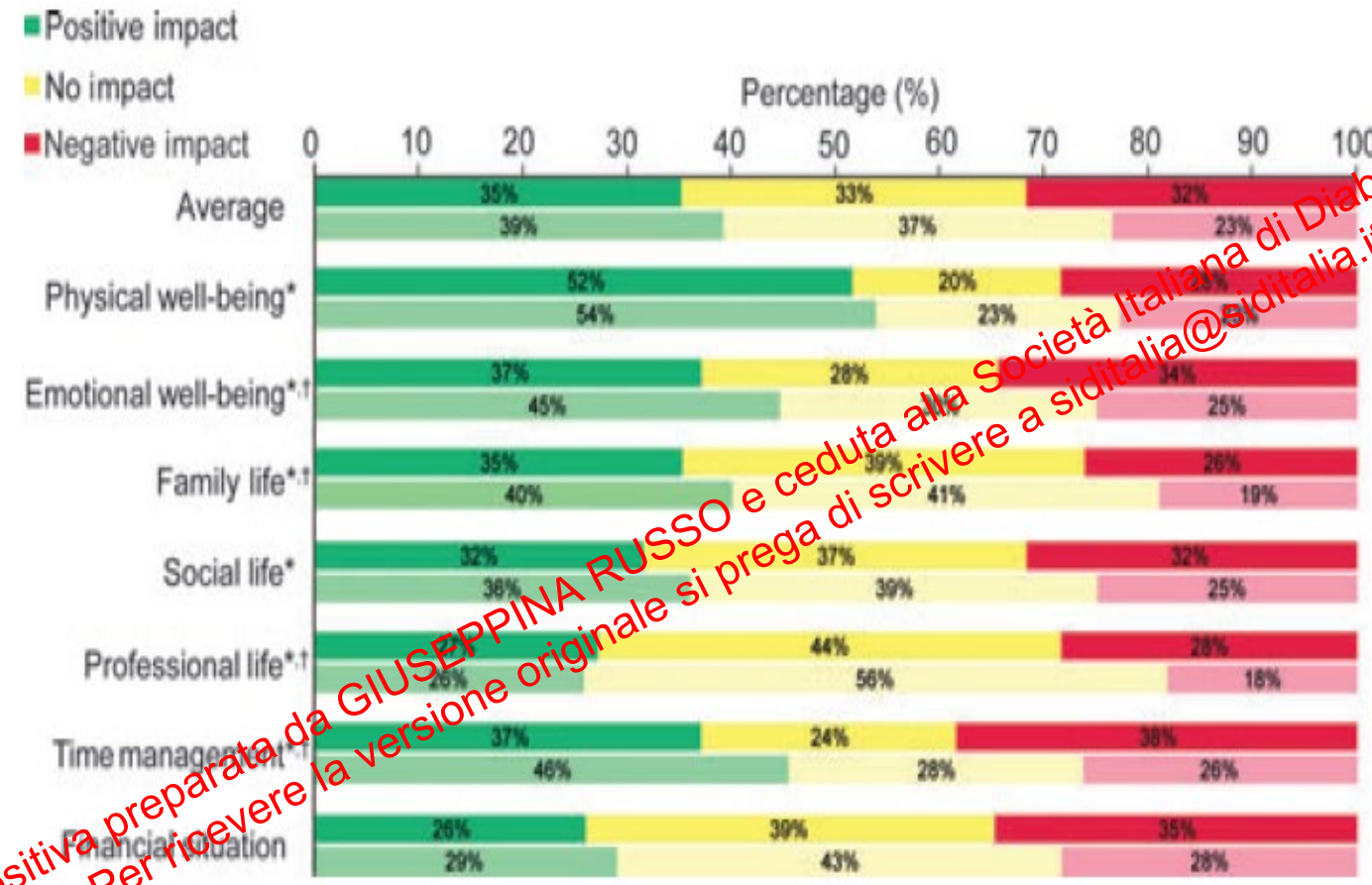


FIGURE 2 Patient reports: impact of insulin treatment on life domains in patients with Type 1 (non-hatched) and Type 2 (hatched) diabetes mellitus (n = 1536). *Positive and negative responses differ significantly ($P < 0.05$); †reports from patients with Type 1 and Type 2 diabetes differ significantly ($P < 0.05$).

Diabet. Med. 29, 682–689 (2012)

DIABETICMedicine

DOI: 10.1111/dme.12128

Review Article

Real-world factors affecting adherence to insulin therapy in patients with Type 1 or Type 2 diabetes mellitus: a systematic review

→ 17 studi (13 in USA)

M. J. Davies[1], J. J. Gagliardino[2], L. J. Gray[3], K. Khunti[3], V. Mohan[4] and R. Hughes[5]

Abstract

Aims To identify real-world factors affecting adherence to insulin therapy in patients with Type 1 or Type 2 diabetes mellitus.

Methods A literature search was conducted in PubMed and EMBASE in November 2011 to identify studies reporting factors associated with adherence/non-adherence to insulin therapy in adults with Type 1 or Type 2 diabetes.

Results Seventeen studies were identified; six used self-reported measures and 11 used calculated measures of adherence. Most (13/17) were conducted exclusively in the USA. Four categories of factors associated with non-adherence were identified: predictive factors for non-adherence, patient-perceived barriers to adherence, type of delivery device and cost of medication. For predictive factors and patient-perceived barriers, only age, female sex and travelling were associated with non-adherence in more than one study. Fear of injections and embarrassment of injecting in public were also cited as reasons for non-adherence. Conversely, adherence was improved by initiating therapy with, or switching to, a pen device (in four studies), and by changing to an insurance scheme that lowered the financial burden on patients (in two studies).

Conclusions Adherence to insulin therapy is generally poor. Few factors or patient-perceived barriers were consistently identified as predictive for non-adherence, although findings collectively suggest that a more flexible regimen may improve adherence. Switching to a pen device and reducing patient co-payments appear to improve adherence. Further real-world studies are warranted, especially in countries other than the USA, to identify factors associated with non-adherence and enable development of strategies to improve adherence to insulin therapy.

Diabet. Med. 30, 512–524 (2013)

Sono state identificate 4 categorie di fattori associati all'aderenza alla terapia insulinica:

- Fattori predittivi (età, sesso femminile e viaggi),
- Barriere percepite del paziente,
- Device
- Costi (assicurazione in USA)

Poca concordanza tra gli studi, l'unico che emerge costantemente sono i viaggi

In generale, «poor quality» per il metodo di valutazione di aderenza e popolazione solo su base volontaria

DIABETICMedicine

DOI: 10.1111/dme.12128

Review Article

Real-world factors affecting adherence to insulin therapy in patients with Type 1 or Type 2 diabetes mellitus: a systematic review

M. J. Davies[1], J. J. Gagliardino[2], L. J. Gray[3], K. Khunti[3], V. Mohan[4] and R. Hughes[5]

Diabet. Med. 30, 512–524 (2013)

Altri predittori:
Depressione, autostima, diabetes distress

Table 4 Summary of predictive factors for adherence to insulin and strategies for improving adherence to insulin

Positive predictors of adherence to insulin	Negative predictors of adherence to insulin	Strategies for improving adherence
Changing insulin therapy		
• Switching from a vial/syringe to a pen device [30,33]	• Switching from a vial/syringe to a pen device [34]	• Increased use/availability of pen devices
• Initiating insulin therapy with a pen device instead of a vial/syringe [31,32,34]		
Changing type of insurance plan		
• Switching from a traditional formulary scheme to a value-based insurance design [36,37]		• Reduce the financial burden of insulin therapy to the patient
Predictive factors for adherence to insulin		
• Older age [23,25]	• Older age [21]	• Provide additional medical support to patients (e.g. nurses, psychiatrists)
• Support from a diabetic nurse specialist [22]	• Female gender [21,22]	• Educational programmes to increase awareness of diabetes
• Physical disability [23]	• Single status [21]	• Develop therapies that allow for fewer injections and increased flexibility in treatment regimen
• Higher household income [23]	• Lower HbA_{1c} levels [21]	
• Following a healthy diet [23]	• Being a student [23]	
• Perceived self-efficacy [25]	• Having the highest level of education [23]	
• Hypoglycaemia awareness [24]	• Needing a large number of injections [23]	
• Previous experience of liaison psychiatry [24]	• Type 2 diabetes (vs. patients with Type 1 diabetes) [23]	
• Previous experience of cognitive behavioural therapy [24]		
Patient-perceived barriers to insulin adherence		
• Lower perceived consequences of diabetes [27]		• Provide additional medical support to patients (e.g. nurses, psychiatrists)
• Higher perception of personal control [27]		

Diabetes Care. 1994 Oct;17(10):1178-85.

Insulin omission in women with IDDM.

Polonsky WH[1], Anderson BJ, Lohrer PA, Aponte JE, Jacobson AM, Cole CF.

Abstract

OBJECTIVE:

To describe the extent of intentional insulin omission in an outpatient population of women with insulin-dependent diabetes mellitus (IDDM) and examine its relationship to disordered eating, attitudes toward diabetes, other psychosocial factors, long-term complications, and glycemic control.

RESEARCH DESIGN AND METHODS:

Before their routinely scheduled clinic appointments, female IDDM patients who were 13-60 years of age completed a self-report survey **(final n = 341)**. The survey included standardized questionnaires assessing disordered eating attitudes and behaviors, psychological functioning (general distress, diabetes-specific distress, and hypoglycemic fear), attitudes toward diabetes, and self-care behaviors. All subjects were assessed for glycosylated hemoglobin within 30 days of survey completion. Long-term complications were determined through chart review.

RESULTS:

Approximately 31% of the subject sample, representing women of all ages, reported intentional insulin omission, but only 8.8% reported frequent omission. Compared with non-omitters, omitters reported more disordered eating, greater psychological distress (general and diabetes-specific), more hypoglycemic fear, poorer regimen adherence, and greater fears concerning improved diabetes management (which may lead to weight gain). **Omitters evidenced poorer glycemic control, more diabetes-related hospitalizations, and higher rates of retinopathy and neuropathy.** Multivariate examination revealed only two variables that independently predicted omission: diabetes-specific distress and fear of improved glycemic control ("because **I will gain weight**"). Of the omitters, approximately half reported omitting insulin for weight-management purposes (weight-related omitters). These subjects evidenced significantly greater psychological distress, poorer regimen adherence (including more frequent omission), poorer glycemic control, and higher rates of complications than did non-weight-related omitters as well as non-omitters. Non-weight-related omitters tended to fall between weight-related omitters and non-omitters on most measures of psychological functioning, adherence, and glycemic control.

CONCLUSIONS:

These findings suggest that insulin omission is common, that it is not limited to younger women, and that the medical consequences of omission, especially frequent omission, may be severe. Although a strong association between omission and disordered eating was observed, these data suggest that this link may be complicated by important diabetes-specific factors. Patients preoccupied with eating and weight concerns may also become emotionally overwhelmed by diabetes and/or fearful of normoglycemia (and the associated weight-related consequences), thus reinforcing the desire to omit insulin and maintain elevated blood glucose levels.

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

M. Sue Kirkman,[1] Megan T. Rowan-Martin,[2] Rebecca Levin,[3] Vivian A. Fonseca,[4] Julie A. Schmittdiel,[5] William H. Herman,[6] and Ronald E. Aubert[7]

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

Variable	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, 1.21	0.4105
College grad vs. high school equivalent	1.20	1.18, 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

Giovani, maschi, di livello educazionale ed economico più basso hanno maggior probabilità di non essere aderenti

Diabetes Care Publish Ahead of Print, published online January 8, 2015

Medication Taking and Diabetes

A Systematic Review of the Literature

Patient Factor	Medication Factor	Provider or System Factor
Fears: disease worsening, hypoglycemia, needles, social stigma, weight gain	Complexity of regimen (eg, more than 1 DM drug, splitting tablets, drawing up insulin)	Fear that patient will not be able to use therapy
Knowledge and skill: education	Frequency of dosing (2 or more times daily results in poorer adherence)	Knowledge: medications, use of insulin, monitoring, diabetes treatment
Self-efficacy	Cost	Skill: able to demonstrate proper use of devices
Health beliefs	Adverse effects	Inadequate educational support
Depression		Inadequate follow-up resources
Lack of confidence in immediate or future benefits of the medication		
Remembering doses and refills		

DIABETICMedicine
DOI: 10.1111/dme.13793

Invited Review

Is insulin pump therapy effective in Type 1 diabetes?

J. C. Pickup

Department of Diabetes, King's College London, Guy's Hospital, London, UK

Accepted 6 August 2018

L'aderenza è un parametro importante anche con le «nuove tecnologie»

L'aderenza terapeutica con le nuove tecnologie deve tenere conto di numerosi e «diversi» fattori

Table 3 Common features of continuous subcutaneous insulin infusion non-responders

- Persistently elevated HbA_{1c}.
- Appropriate pump education, diabetes care, skills and resources.
- Usually a desire to continue CSII in spite of poor control.
- No excessive fear of hypoglycaemia.
- Evidence of general non-adherence (e.g. elevated BMI, smoking, excessive alcohol intake).
- Evidence of specific non-adherence (e.g. missed boluses, infrequent SMBG).
- Often high external locus of control, when measured.

CSII, continuous subcutaneous insulin infusion; SMBG, self-monitoring of blood glucose.

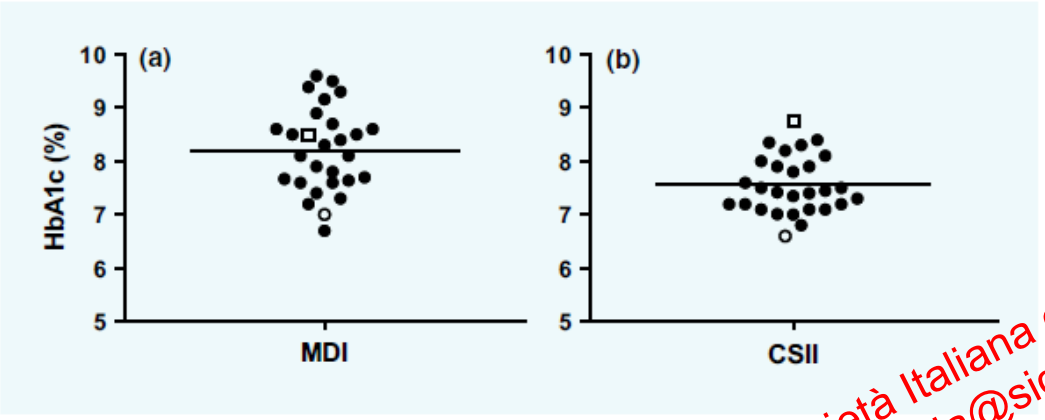


FIGURE 1 Final mean HbA_{1c} on multiple daily insulin injections (MDI) (a) and continuous subcutaneous insulin infusion (CSII) (b) in selected trials comparing the two treatments. ○, Diabetes Control and Complications Trial; □, REPOSE study participants with baseline $HbA_{1c} \geq 58$ mmol/mol (7.5%); ●, trials from a meta-analysis comparing MDI vs. CSII [3]. Horizontal bar = mean.

Table 1 Checklist of key elements of best practice in insulin pump therapy.

- Regular, long term follow-up to identify worsening control.
- Computer downloads to optimize pump treatment and identify non-adherence (missed boluses, etc.).
- Reinforce main pump procedures, particularly:
  - SMBG frequency;
  - minimize missed boluses;
  - timing of meal bolus: 15–20 min before meal;
  - use of bolus calculator;
  - basal rate adjustment as necessary;
  - infusion set practice: site rotation, use for ≤ 3 days;
  - exercise management – meal bolus and basal rate adjustments.
- Identify non-responders:
  - dietary advice to help reduce BMI;
  - check for intercurrent illness;
  - group interaction may help motivation.

SMBG, self-monitoring of blood glucose.

Table 2 Possible psychological factors involved in poor adherence with continuous subcutaneous insulin infusion

- Fear of hypoglycaemia.
- Unrealistic expectations of CSII, discouraged by results.
- Negative body image/social acceptance of wearing a pump.
- Dislike of dependence on a machine.
- Distrust of HbA_{1c} as measure of success.
- Not willing to put in hard work necessary for good control, lack of motivation.
- High external locus of control, passive approach to diabetes care.

CSII, continuous subcutaneous insulin infusion.

DOI: 10.1111/dme.13568

Systematic Review or Meta-analysis

Best friend or spy: a qualitative meta-synthesis on the impact of continuous glucose monitoring on life with Type 1 diabetes

L. H. Messer[1,2], R. Johnson[2], K. A. Driscoll[1] and J. Jones[2]

[1]University of Colorado, Barbara Davis Center, Aurora and [2]University of Colorado, College of Nursing,Denver, CO, US

Accepted 12 December 2017

What's new?

- Continuous glucose monitoring (CGM) is the cornerstone of future diabetes technologies, and it is essential that healthcare providers comprehend the user experience with CGM in order to promote sustained use.
- This qualitative meta-synthesis synthesizes nine studies (343 participants) to provide a meaningful picture of the impact of CGM: interacting with CGM, emotional burden, feeling different, feeling empowered, using glucose information and affecting relationships.
- This synthesis identifies targets for intervention including optimizing CGM settings, discussing empowerment strategies, and forming partnerships with parents, significant others and providers.

Abstract

Aims This is a meta-synthesis of extant qualitative literature related to impact of co (CGM). CGM has been available for a decade for the management of Type 1 diabetes artificial pancreas technologies. Clinical uptake of CGM is an important area of inquir synthesis is to understand the impact of CGM on individuals with Type 1 diabetes and othe providers) in order to design appropriate clinical interventions for adherence.

Methods Studies published in English between 2007 and 2017 were included, reflecting c PubMed, PsychINFO, CINALH, Web of Science and EMBASE databases were queried CGM, qualitative, experience and Type 1 diabetes. Included articles contained original research on CGM, sensor-augmented pump or closed-loop therapies. Articles underwent q interpretive integration by a multidisciplinary team.

Results Nine articles (343 participants) met the inclusion criteria and were included in the synthesis. Six novel themes emerged: interacting with CGM, burden of living with CGM, feeling different from others, feeling empowered, interacting with glucose information and impact on relationships.

Conclusion CGM affects physical, emotional and relational aspects of life. Clinicians can help minimize the burden of CGM with carefully delivered education and expectation-setting with individuals. Empowerment and relational partnerships in diabetes care can be explored to maximize satisfaction with CGM. Systematic interpretive synthesis of qualitative studies provides a comprehensive, contextual understanding of the impact of CGM on daily life and relationships.

Low Adherence and glucose control

Received: 16 March 2018 | Revised: 20 July 2018 | Accepted: 23 July 2018
DOI: 10.1002/dmrr.3051

REVIEW ARTICLE

WILEY

A systematic review of non-genetic predictors and genetic factors of glycated haemoglobin in type 1 diabetes one year after diagnosis

Emilie Gloaguen[1,2] | Nathalie Bendelac[3] | Marc Nicolino[3] | Cécile Julier[1,2] | Flavie Mathieu[4]

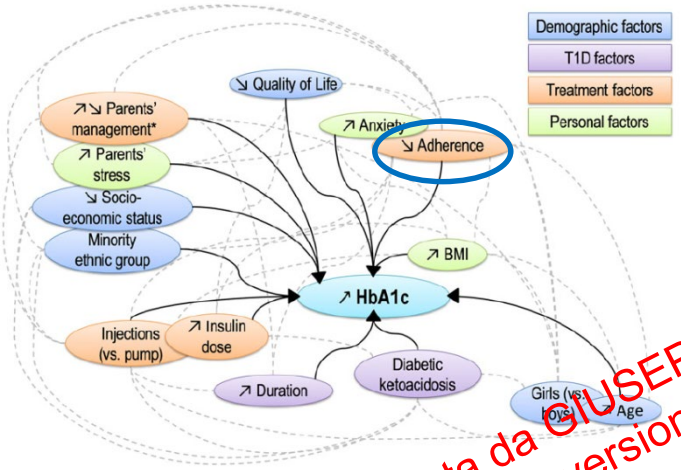
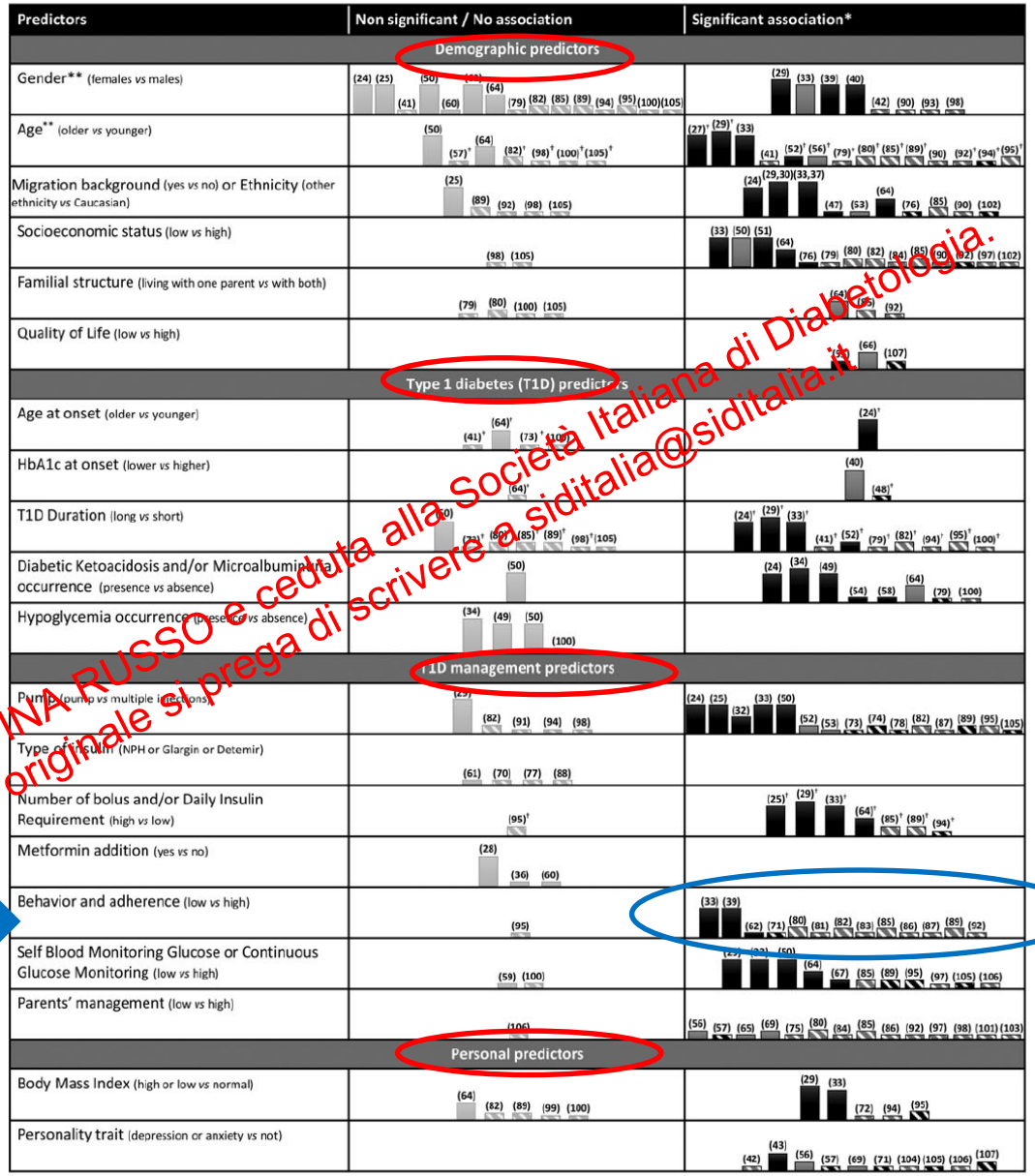


FIGURE 3 Schematic representation of factors associated with an increase of HbA1c level reported in selected papersblack arrow: factors associated with HbA1c level; dotted grey line: significant interactions between HbA1c factors. *: Parents' authoritative management effects depend on the patient's age

Diabetes Metab Res Rev. 2018;34:e3051.
https://doi.org/10.1002/dmrr.3051



Legends
Size: ▭: 50-250 – ▭: 250-500 – ▭: 500-1000 – ▭: 1000-10000 – ▭: >10000
Color depending of the p-value: ■: p<0.001 – ■: p=[0.05-0.001[– ■: p>0.05
Quality: ▭: High quality – ▨: Intermediate quality

Clinical Therapeutics/Volume 33, Number 1, 2011

A Review of Diabetes Treatment Adherence and the Association with Clinical and Economic Outcomes

Carl Asche[1,2]; Joanne LaFleur[1,3]; and Christopher Conner[4]

[1]*Department of Pharmacotherapy, University of Utah;* [2]*Department of Physical Therapy, University of Utah; and Center on Aging, University of Utah;* [3]*Salt Lake City VA Informatics, Decision Enhancement, and Surveillance (IDEAS) Center; and* [4]*Clinical Development, Medical & Regulatory Affairs, Health Economics and Outcomes Research, Novo Nordisk, Princeton, New Jersey*

13 studi positivi su aderenza predittore HbA1c

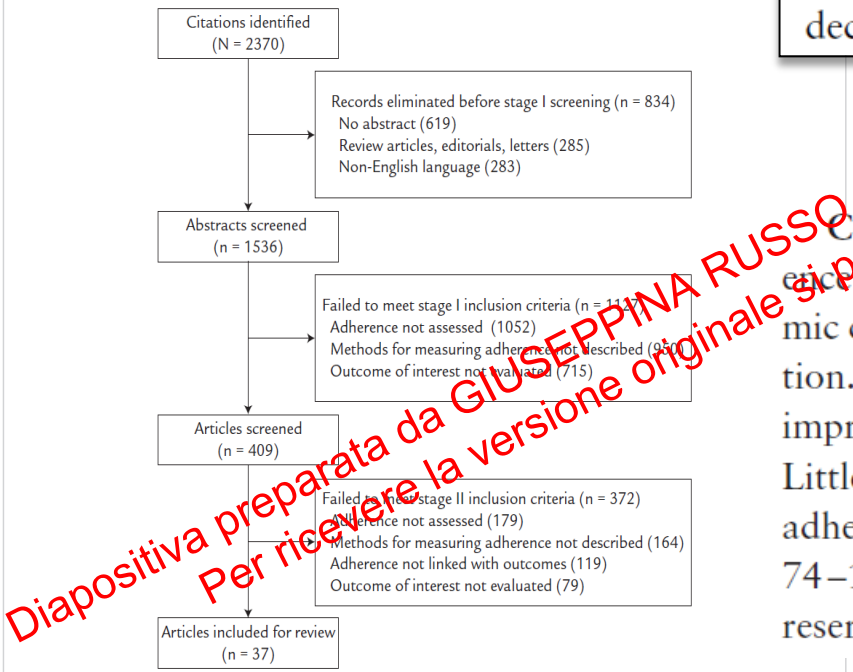


Figure 1. Flow of information through the different phases of review.

Depending on the study, for every 10% increase in adherence there were corresponding 0.1% to 0.0014% decreases in A1C.[27,34,58,61] For many of the studies, we

Conclusions: Based on the literature, better adherence was found to be associated with improved glycemic control and decreased health care resource utilization. There was no consistent association between improved adherence and decreased health care costs. Little data were available on the association between adherence and quality of life. (*Clin Ther.* 2011;33: 74–109)

Studi su DM2, no studi su aderenza e dm1

Adherence to insulin treatment, glycaemic control, and ketoacidosis in insulin-dependent diabetes mellitus

Lancet 1997

Andrew D Morris, Douglas I R Boyle, Alex D McMahon, Stephen A Greene, Thomas M MacDonald, Ray W Newton, for the DARTS/MEMO Collaboration

Background Intensive insulin treatment effectively delays the onset and slows the progression of microvascular complications in insulin-dependent diabetes mellitus (IDDM). Variable adherence to insulin treatment is thought to contribute to poor glycaemic control, diabetic ketoacidosis, and brittle diabetes in adolescents and young adults with IDDM. We assessed the association between the prescribed insulin dose and the amount dispensed from all community pharmacies with the Diabetes Audit and Research in Tayside Scotland (DARTS) database.

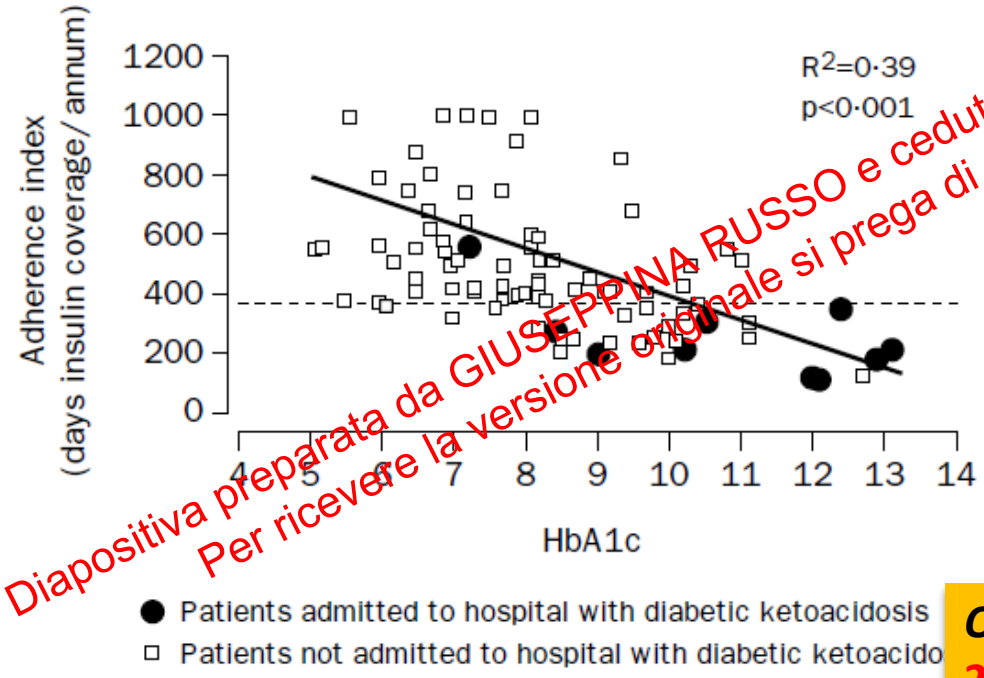


Figure 1: **Linear regression of the association between glycaemic control (HbA_{1c}) and adherence index**

89 pazienti identificati nel DARTS database in Scozia
Età media 16 anni (adolescenti)

OR per DKA:
24.57 (4.66-129.49); P=0.001

***OR per diabetes acute hospitalization*:**
10.86 (1.60-73.48); P=0.02

Adherence to insulin treatment, glycaemic control, and ketoacidosis in insulin-dependent diabetes mellitus

Andrew D Morris, Douglas I R Boyle, Alex D McMahon, Stephen A Greene, Thomas M MacDonald, Ray W Newton, for the DARTS/MEMO Collaboration

Age affects both adherence and glucose control

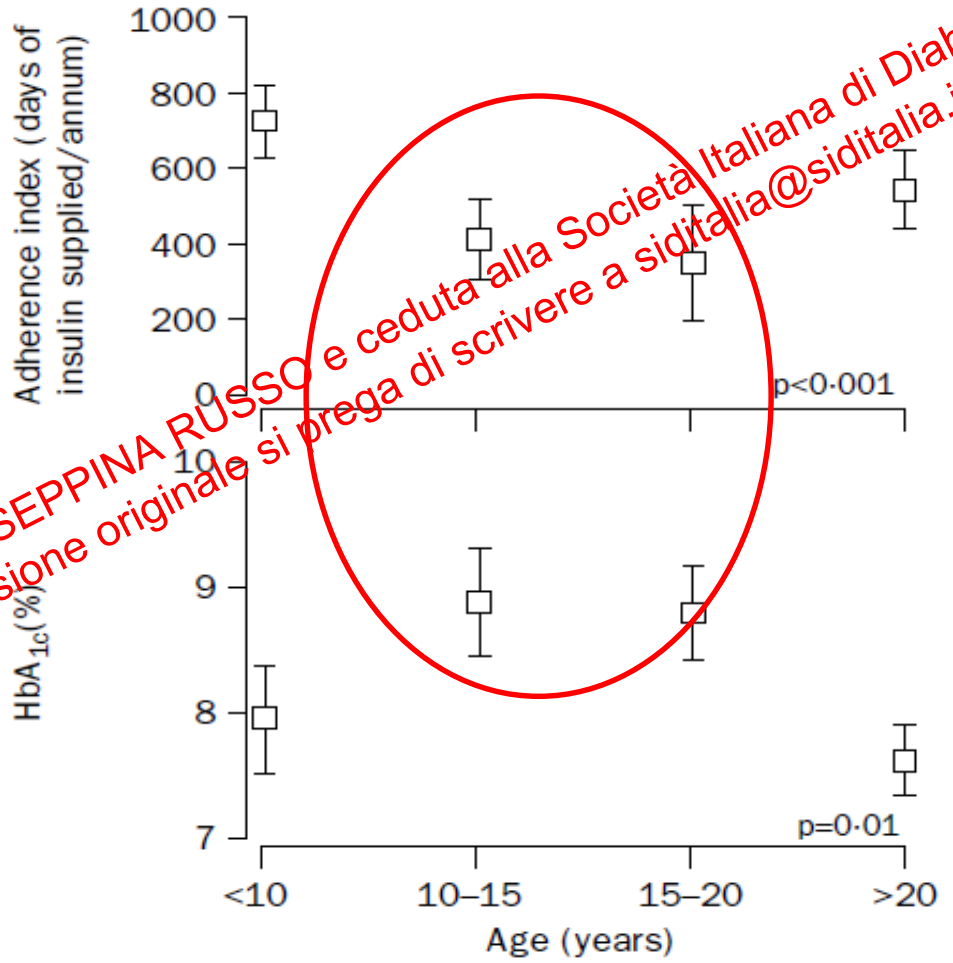


Figure 2: **Association of age to glycaemic control (bottom panel) and age to adherence index (upper panel)**
Data are mean (SD).

Open Access Research

BMJ Open

Factors associated with high levels of glycated haemoglobin in patients with type 1 diabetes: a multicentre study in Brazil

Carine Sousa Andrade,[1,2] Guilherme Sousa Ribeiro,[1,3]
Carlos Antonio Souza Teles Santos,[1,4] Raimundo Celestino Silva Neves,[1]
Edson Duarte Moreira Jr[1,5]

Strengths and limitations of this study

- This cross-sectional, multicentre study included 979 patients with type 1 diabetes mellitus from 10 large Brazilian cities, representing four of the five regions of the country.
- We measured the glycated haemoglobin (HbA1c) levels for all participants in a single laboratory and used the same reference method of liquid chromatography, thus avoiding problems with lack of standardisation reported by other authors.
- In order to identify independent factors associated with increased levels of HbA1c, we applied robust, multiple variable models, using a hierarchical approach according to a previously defined conceptual framework. This method accounts for hierarchical inter-relationships between variables and for the potential underestimation of the effects of distal determinants.
- Data on behavioural and clinical characteristics were collected through interviews, potentially introducing a certain degree of inaccuracy for some answers.

Block 1: Sociodemographic
Age
Sex
Race/skin colour
Education
Block 2: Behavioural
Self-perception of adherence to:
Diet
Insulin
Participation in:
Lecture in Diabetes in the last 12 months
Association of patients with diabetes
Block 3: Clinical
Regular medical visit in the last 12 months
Endocrinologist visit in the last 12 months
Diabetes care in specialised service in the last 12 months
Diabetes care in private clinic in the last 12 months
Diabetes care in the same service
Time since diabetes onset
Self-monitoring Glucose
Number of insulin doses per day
Measurement of HbA1c in the last 12 months

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)	
Sex				
Male	354	9.25 (2.08)	Ref	0.122
Female	625	9.48 (2.29)	0.229 (–0.061 to 0.518)	
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	523	9.72 (2.25)	0.931 (0.508 to 1.354)	
Self-perception of adherence to insulin				
Excellent	750	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)	
Participation in association of patients with diabetes				
Yes, still participate	116	9.09 (1.88)	Ref	0.023
Yes, but no more participate	124	9.02 (1.80)	–0.067 (–0.627 to 0.492)	
No, I never participated	713	9.51 (2.32)	0.418 (–0.016 to 0.851)	

Research: Educational and Psychological Aspects

Socio-economic, demographic and clinical correlates of poor glycaemic control within insulin regimens among children with Type 1 diabetes: the SEARCH for Diabetes in Youth study

L. Snyder[1], J. M. Stafford[2], D. Dabelea[3], J. Divers[2], G. Imperatore[4], J. Law[5], J. M. Lawrence[7], C. Pihoker[8] and E. J. Mayer-Davis[6]

Title: Diabetic Medicine
Created by: Maria Davie
Accepted: 29.04.2019

Methods Self- or parent-reported data from 1095 children with Type 1 diabetes aged 10–17 years were collected on insulin regimen, sociodemographics, diabetes self-management, diabetes-related family conflict and barriers to care. Multivariable logistic regression analysis identified poor glycaemic control correlates within each insulin regimen.

Title: Diabetic Medicine
Created by: Maria Davie
Accepted: 29.04.2019

Table 3 Adjusted odds ratios (95% CI) for multivariable logistic regression model predicting poor glycaemic control [$HbA_{1c} \geq 80$ mmol/mol (9.5%)] within insulin regimens in children with Type 1 diabetes

	Insulin regimen					
	Insulin pump *N*=596 (171 events)		Basal–bolus injections *N*=160 (68 events)		Mixed insulin *N*=171 (90 events)	
Factor	Adjusted OR (95% CI)*	*P*	Adjusted OR (95% CI)*	*P*	Adjusted OR (95% CI)*	*P*
Diabetes duration (years)†	1.1 (0.97, 1.22)	0.1594	1.1 (0.89, 1.38)	0.3581	1.1 (0.90, 1.47)	0.2783
Non-white race/ethnicity (referent: non-Hispanic white)	2.7 (1.50, 4.72)	0.0008	1.7 (0.64, 4.62)	0.2848	1.7 (0.70, 4.22)	0.2421
Female sex (referent: male)	1.1 (0.69, 1.66)	0.7502	0.5 (0.21, 1.22)	0.1280	1.4 (0.60, 3.40)	0.4632
Age at cohort study visit†	1.1 (0.99, 1.22)	0.0634	0.9 (0.76, 1.12)	0.4117	1.1 (0.89, 1.26)	0.4888
Number of households lived in ≥ 2 (referent: living in 1 household)	1.8 (1.05, 3.08)	0.0331	2.2 (0.8, 5.95)	0.1384	4.8 (1.21, 19.27)	0.0256
Medicaid/Medicare Insurance (referent: private insurance)	2.0 (1.19, 3.38)	0.0090	0.8 (0.39, 1.93)	0.5565	2.2 (0.985, 5.17)	0.0649
Number of times missed a shot		<0.0001		0.1360		0.2130
1–5/week vs <1 week	4.0 (2.40,	<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	1.2 (1.10, 1.35)	0.0002	1.1 (1.03, 1.22)	0.0103

I fattori predittivi di cattivo compenso variano in base al tipo di terapia

Received: 28 January 2019 | Revised: 28 March 2019 | Accepted: 5 April 2019
DOI: 10.1111/pedi.12856

ORIGINAL ARTICLE

ISPAD WILEY

Identification of clinically relevant dysglycemia phenotypes based on continuous glucose monitoring data from youth with type 1 diabetes and elevated hemoglobin A1c

Anna R. Kahkoska[1] | Linda A. Adair[1] | Allison E. Aiello[2] | Kyle S. Burger[1] | John B. Buse[3] | Jamie Crandell[4] | David M. Maahs[5,6] | Crystal T. Nguyen[7] | Michael R. Kosorok[7,8] | Elizabeth J. Mayer-Davis[1,3]

Background/Objective: To identify and characterize subgroups of adolescents with type 1 diabetes (T1D) and elevated hemoglobin A1c (HbA1c) who share patterns in their continuous glucose monitoring (CGM) data as "dysglycemia phenotypes."

Results: The study sample included 234 adolescents (49.8% female, baseline age 14.8 ± 1.1 years, baseline T1D duration 6.4 ± 3.7 years, baseline HbA1c 9.6% ± 1.2%,

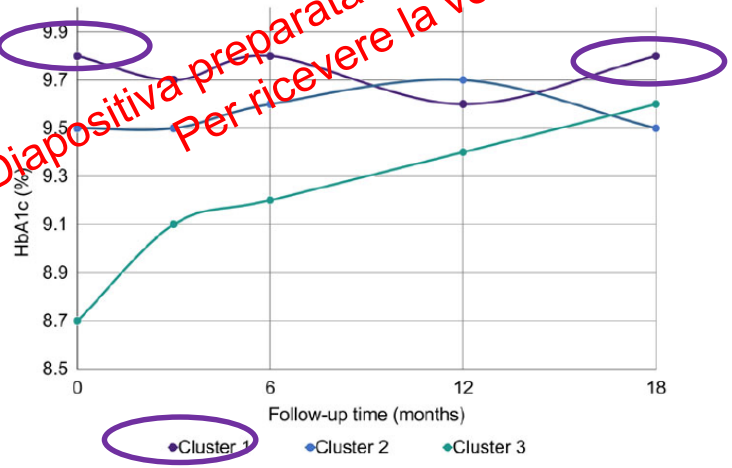
Dysglycemia Cluster 1
Dysglycemia Cluster 2
Dysglycemia Cluster 3

Cluster 2 (22.7%): severa iperglicemia notturna, moderata ipoglicemia, moderata variabilità glicemica

Cluster 3 (17.1%): moderata iperglicemia notturna, massima esposizione ipoglicemia e massima variabilità glicemica

Cluster 1 (60.3%): iperglicemia severa daytime , poca variabilità glicemica , no ipoglicemia

Andamento glicata nel tempo



Pediatric Diabetes. 2019;1–11.

Received: 28 January 2019 | Revised: 28 March 2019 | Accepted: 5 April 2019
DOI: 10.1111/pedi.12856

ORIGINAL ARTICLE

ISPAD WILEY

Identification of clinically relevant dysglycemia phenotypes based on continuous glucose monitoring data from youth with type 1 diabetes and elevated hemoglobin A1c

Anna R. Kahkoska[1] | Linda A. Adair[1] | Allison E. Aiello[2] | Kyle S. Burger[1] | John B. Buse[3] | Jamie Crandell[4] | David M. Maahs[5,6] | Crystal T. Nguyen[7] | Michael R. Kosorok[7,8] | Elizabeth J. Mayer-Davis[1,3]

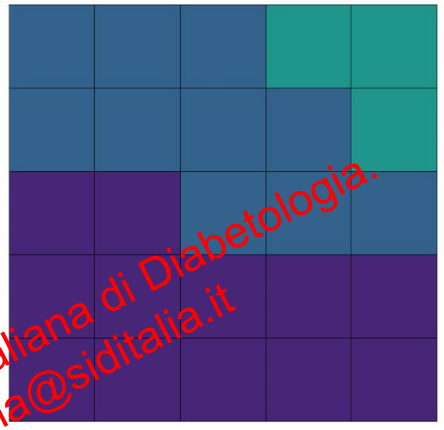


TABLE 1 Baseline characteristics of FLEX participants Overall and by Dysglycemia Cluster

Baseline characteristics, n (%) or mean (SD)	All (n = 234)	Dysglycemia Cluster			
		Dysglycemia Cluster 1 (n = 141, 60.3%)	Dysglycemia Cluster 2 (n = 53, 22.7%)	Dysglycemia Cluster 3 (n = 40, 17.1%)	*P*-value
Psychosocial characteristics					
Motivation[b]	7.6 (1.6)	7.7 (1.4)	7.7 (1.7)	7.5 (1.8)	0.76
Intention[b]	9.1 (1.0)	9.2 (0.9)	8.9 (1.1)	8.9 (1.1)	0.22
Problem solving[c]	105.6 (13.0)	106.2 (12.5)	105.5 (14.3)	103.5 (13.1)	0.50
Adherence to diabetes self-management[d]	55.2 (11.6)	55.5 (11.9)	53.3 (9.7)	56.7 (12.8)	0.33
Depression symptoms[e]	9.1 (8.4)	8.6 (7.6)	9.8 (10.0)	10.1 (8.7)	0.47
Quality of life[f]	81.0 (12.4)	81.7 (12.0)	79 (12.7)	80.6 (13.3)	0.50
Fear of hypoglycemia[g]					
Maintain high BG	1.2 (0.9)	1.2 (0.9)	1.2 (0.8)	1.2 (0.8)	0.99
Helplessness/worry	1.1 (0.6)	1.1 (0.6)	1.1 (0.7)	1.1 (0.4)	0.81

Pediatric Diabetes 2009: 10: 142–148
doi: 10.1111/j.1399-5448.2008.00462.x

Pediatric Diabetes

Original Article

Missed bolus doses: devastating for metabolic control in CSII-treated adolescents with type 1 diabetes

Studio svedese DM1 adolescenti
38% ha saltato >15% boli

Table 1. Descriptive data in the 90 adolescents

Variable	Mean ± SD/number
Age (yr)	14.8 ± 2.1
Male/female (n)	34/56
Diabetes duration (yr)	7.9 ± 3.8
Pump therapy duration (yr)	3.4 ± 1.9
HbA1c (%)	7.3 ± 1.2
BMI (kg/m^2)	22.0 ± 3.4
BMI SDS (kg/m^2)	1.2 ± 1.1

BMI, body mass index; BMI SDS, BMI standard deviation scores; HbA1c, haemoglobin A1c.
Data are mean ± SD.

Table 2. Comparisons between the groups who had missed ≤15 and >15% of the bolus doses the day before the visit

	Missed ≤15% (n = 56)	Missed >15% (n = 34)	p Level
Age (yr)	14.8 ± 2.2	14.9 ± 2.0	0.849
Diabetes duration (yr)	7.6 ± 3.8	8.3 ± 3.7	0.372
Pump therapy duration (yr)	3.1 ± 1.8	3.9 ± 1.9	0.070
BMI (kg/m^2)	22.1 ± 3.6	21.8 ± 3.8	0.719
BMI SDS (kg/m^2)	1.2 ± 1.1	1.0 ± 1.3	0.449
HbA1c (%)	7.0 ± 1.0	7.8 ± 1.2	0.001
Mean doses per day, for 4 wk (n)	5.3 ± 1.7	3.8 ± 1.7	<0.001
SMBG per day (n)	3.6 ± 1.8	2.4 ± 1.8	0.003
Insulin dose (U/kg)	0.83 ± 0.18	0.82 ± 0.17	0.862
Basal dose/total dose (%)	55 ± 12	65 ± 14	0.001

BMI SDS, BMI standard deviation scores; HbA1c, haemoglobin A1c; SMBG, self-monitoring of blood glucose.
Data are mean ± SD.

From: **Effect of Medication Nonadherence on Hospitalization and Mortality Among Patients With Diabetes Mellitus**

Arch Intern Med. 2006;166(17):1836-1841. doi:10.1001/archinte.166.17.1836

Table 4. Association Between Medication Nonadherence Based on the Summary Proportion of Days Covered and Outcomes Across Different Patient Subgroups*

Patient Subgroup	No. of Patients	Odds Ratio (95% Confidence Interval)	
		All-Cause Mortality	All-Cause Hospitalization
Diet-controlled diabetes mellitus	2347	2.26 (1.35-3.69)	1.62 (1.24-2.12)
Insulin only	1302	1.95 (1.25-3.04)	1.37 (1.02-1.84)
Oral hypoglycemics only	6575	1.73 (1.27-2.36)	1.39 (1.18-1.64)
Hypertension	9408	1.74 (1.39-2.18)	1.47 (1.29-1.66)
Coronary artery disease	3655	1.79 (1.33-2.40)	1.55 (1.29-1.86)
Hypercholesterolemia	7464	2.04 (1.58-2.63)	1.53 (1.32-1.76)
Heart failure	1754	1.68 (1.19-2.38)	1.40 (1.09-1.79)
Age ≥65 y	6427	1.91 (1.51-2.40)	1.41 (1.22-1.64)
Baseline levels at goal			
Glycosylated hemoglobin	5273	2.09 (1.56-2.80)	1.36 (1.15-1.62)
Blood pressure	3924	1.41 (0.98-2.03)	1.44 (1.18-1.75)
Low-density lipoprotein cholesterol	7782	1.74 (1.37-2.22)	1.47 (1.28-1.69)

*Adjusted for all variables in Table 1.

Association Between Medication Nonadherence Based on the Summary Proportion of Days Covered and Outcomes Across Different Patient Subgroups*

ORIGINAL ARTICLE

Insulin Restriction and Associated Morbidity and Mortality in Women with Type 1 Diabetes

ANN E. GOEBEL-FABBRI, PHD[1,2]
JANNA FIKKAN, MA[1]
DEBRA L. FRANKO, PHD[3]
KIMBERLY PEARSON, MD[2,4]
BARBARA J. ANDERSON, PHD[5]
KATIE WEINGER, EDD[1,2]

Table 2—*Characteristics of women who died during follow-up*

	Appropriate insulin users	Insulin restrictors
n	16	10
Age at death	57.7 ± 11	44.7 ± 11*
Diabetes duration at death	33.2 ± 12	26.5 ± 11
Baseline characteristics		
A1C (%)	9.4 ± 1.5	11.1 ± 2.1†
BMI (kg/m^2)	29 ± 8	28 ± 7
Problem Areas in Diabetes Survey	48.4 ± 31.5	83.8 ± 27.6†
Hypoglycemia Fear Survey	41.4 ± 14.3	70.9 ± 24.2
Self-Care Inventory	63.2 ± 17.7	46 ± 20.1†
Brief Symptom Inventory (depression)	58.5 ± 11.5	58.6 ± 14.5
Brief Symptom Inventory (anxiety)	55.5 ± 11.5	60.5 ± 11.8
Brief Symptom Inventory–Global Severity Index	56.7 ± 13.4	62.1 ± 10.1
Bulimia Test-Revised	55 ± 24	85 ± 30*
Eating Disorders Inventory (drive for thinness)	3.6 ± 3	5.9 ± 3
Eating Disorders Inventory (bulimia)	1.5 ± 2	4.1 ± 4‡
Eating Disorders Inventory (body dissatisfaction)	9.3 ± 6	11.6 ± 5
Eating Disorders Inventory (total score)	29.6 ± 19.5	47.6 ± 24‡

Data are means ± SD. *$P < 0.01$; †$P < 0.05$; ‡trend $P = 0.07$ (P values associated with Wilcoxon exact tests).

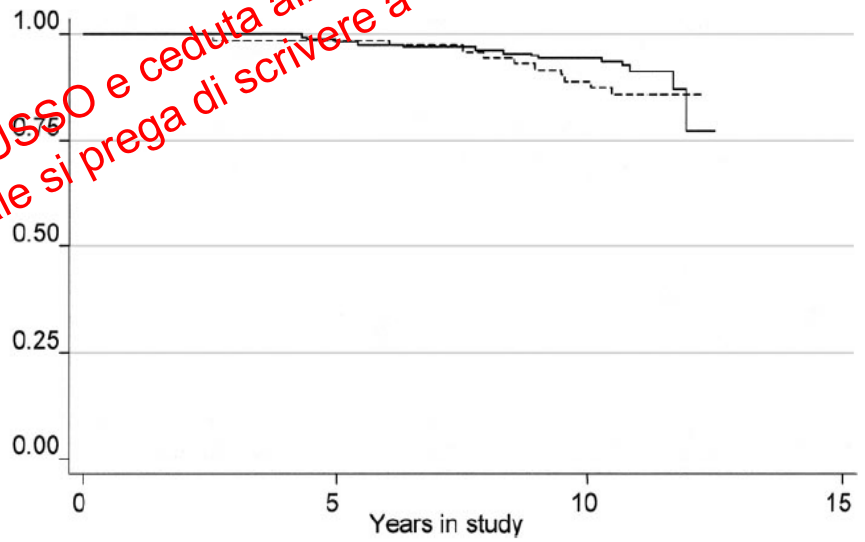


Figure 1—*Unadjusted Kaplan-Meier survival plot of deaths during the study. —, appropriate users; ---, insulin restrictors.*

Journal of Diabetes and Its Complications 27 (2013) 219–223

Contents lists available at SciVerse ScienceDirect

Journal of Diabetes and Its Complications

journal homepage: WWW.JDCJOURNAL.COM

The impact of treatment non-compliance on mortality in people with type 1 diabetes☆,☆☆

Craig J. Currie [a,*], Mark Peyrot [b], Christopher Ll. Morgan [c], Chris D. Poole [c], Sara Jenkins-Jones [c], Richard R. Rubin [d], Christopher M. Burton [e], Marc Evans [f]

Table 1
Baseline characteristics according to diagnosis of medication non-compliance and clinic non-attendance.

	Adherent		Non-compliant/ DNA		p
N	2079		867		
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	19.2	29.1	17.4	0.090
BMI	23.7	4.9	24.6	5.0	0.001
HbA1c (%)	8.5	1.7	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

Continuous data are presented as mean (SD) and categorical data as n (%).

THIN database UK
(350 primary care)
2946 DM1 identified

29.4% non compliant

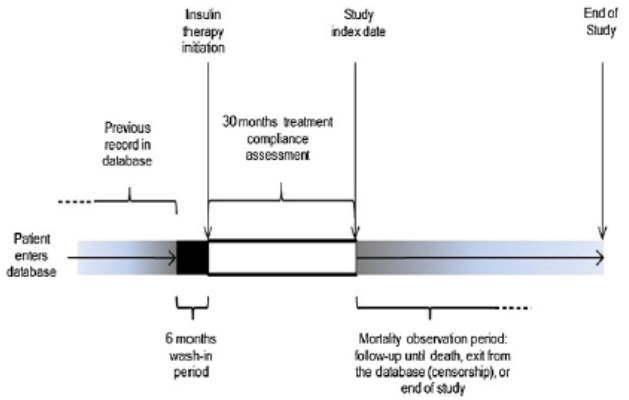


Fig. 1. Schematic diagram of the study design, and definitions of index date and baseline.

Treatment non-compliance is associated with all cause mortality in patients with Type 1 diabetes

Table 2
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

Journal of Diabetes and Its Complications 27 (2013) 219–223
Contents lists available at SciVerse ScienceDirect
Journal of Diabetes and Its Complications
journal homepage: WWW.JDCJOURNAL.COM

The impact of treatment non-compliance on mortality in people with type 1 diabetes☆,☆☆

Craig J. Currie [a,*], Mark Peyrot [b], Christopher Ll. Morgan [c], Chris D. Poole [c], Sara Jenkins-Jones [c], Richard R. Rubin [d], Christopher M. Burton [e], Marc Evans [f]

Clin Ther. 2011 Jan;33(1):74-109. doi: 10.1016/j.clinthera.2011.01.019.

A review of diabetes treatment adherence and the association with clinical and economic outcomes.

Asche C[1], LaFleur J, Conner C.

Abstract

BACKGROUND:

The benefits of drug therapy to diabetic patients in terms of glycemic control, microvascular complications, cardiovascular event risk, mortality, and quality of life have been well established by clinical trial data. However, it has been a challenge **to quantify the relationship between adherence and outcomes such as glycemic control, disease-related events, hospitalizations, cost, and quality of life.**

OBJECTIVE:

This article provides a comprehensive summary of empirical studies that examine the associations between adherence and glycemic control, health care utilization, quality of life, and mortality in patients with diabetes. It is intended to provide a framework for researchers interested in conducting studies to improve their understanding of the value of medication adherence for patients with diabetes.

METHODS:

Relevant published articles were identified through searches of the National Center for Biotechnology PubMed database. Medical subject heading (MESH) terms diabetes mellitus, hypoglycemic agents, and insulin, were each combined with the MESH term medication adherence and with the subheadings economics, prevention and control, psychology, statistics and numerical data, therapy, adverse effects, therapeutic use, and administration and dosage, where available. Studies were included if they met the following criteria: (1) analyzed empirical data on some measure of patient adherence to diabetes pharmacotherapy; (2) described methods for measuring patient adherence; (3) evaluated economic, clinical, or humanistic outcomes related to diabetes; and (4) had as a goal of the research to evaluate the link between patient adherence and outcomes (as a primary or secondary objective). The data from the articles meeting these criteria were then abstracted, including mention of the specific interventions being compared, specific methods for measuring adherence, outcomes compared between adherent and nonadherent patients and how these outcomes were measured, and information on variables that were adjusted for in predictive and causal multivariable models.

RESULTS:

A total of **37 articles that met all 4 criteria in this review underwent data extraction**. Of these studies, 22 (59%) used objective measures to assess adherence, with 1 study using pill counts to assess adherence and 21 using either pharmacy claims or similar refill records to assess refill behavior. The remaining 15 (41%) studies used a wide variety of subjective patient-reported adherence assessments. **The majority (13/23 [57%]) of the glycemic control studies reported that improved adherence was associated with better glycemic control**. The ability to draw a distinction between adherence and glycemic control tended to occur more frequently [7/9 (78%)] among studies that characterized adherence in terms of prescription refills compared with studies that used various constructs for patient-reported adherence measures.

CONCLUSIONS:

Based on the literature, **better adherence was found to be associated with improved glycemic control and decreased health care resource utilization. There was no consistent association between improved adherence and decreased health care costs. Little data were available on the association between adherence and quality of life**.

Diabetes Ther
https://doi.org/10.1007/s13300-019-0617-3

REVIEW

Injectable Antihyperglycemics: A Systematic Review and Critical Analysis of the Literature on Adherence, Persistence, and Health Outcomes

Carol M. Hamersky · Moshe Fridman · Cory L. Gamble · Neeraj N. Iyer

La migliore aderenza alle terapie iniettive nel diabete riduce i costi

ABSTRACT

Introduction: Improving real-world medication adherence to injectable antihyperglycemics in type 2 diabetes mellitus (T2DM) is a clinical challenge. Quantification of the level of adherence required to achieve a minimal clinically important difference (MCID) in glycemic control would assist in meeting this goal. The study objective was to review the literature regarding the relationships of medication adherence and persistence with health outcomes in adult T2DM patients using injectable antihyperglycemics.

Methods: Systematic searches were conducted using electronic databases to identify publications over the last decade. Publications were screened against established eligibility criteria. Study data were extracted, evaluated, and used to identify strengths, limitations, and gaps in current evidence.

Results: Eligibility criteria were met by 38 studies, and this report analyzed 34 studies related to glycemic control ($n = 25$), healthcare resource use ($n = 9$), and healthcare costs ($n = 14$). Eight of these studies examined adherence to glucagon-like peptide-1 receptor agonists (GLP-1 RA), including 1 study regarding adherence to GLP-1 RA or to insulin, and 1 study investigating a GLP-1 RA/insulin combination; the remaining studies involved insulin. Studies used a broad range of measures to classify adherence and persistence, and most measures were unable to reliably evaluate the complexities of patient behavior over time. Better adherence to injectable antihyperglycemic medications was generally found to be associated with improved glycemic control, although no studies attempted to identify a MCID. Although higher diabetes-related pharmacy and total healthcare costs were reported for adherent or persistent patients, these patients tended to have lower diabetes-related and all-cause medical costs.

Conclusion: Results of this review confirmed the effectiveness of injectable antihyperglycemic medications for glycemic control, suggesting that there are clinical and financial consequences to nonadherence. Although attempts were made to quantify the effects of

Carol M. Hamersky and Moshe Fridman contributed equally to this manuscript.

Enhanced Digital Features To view enhanced digital features for this article go to https://doi.org/10.6084/m9.figshare.7956570.

Electronic Supplementary Material The online version of this article (https://doi.org/10.1007/s13300-019-0617-3) contains supplementary material, which is available to authorized users.

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Published online: 03 May 2019

How to improve Adherence in type 1 diabetes ?

Journal of Diabetes

Journal of Diabetes 7 (2015) 315–321

REVIEW ARTICLE

Adherence to insulin treatment in diabetes: can it be improved?

Sheila Anne DOGGRELL[1] and Vincent CHAN[2]

Abstract

Insulin is used in all subjects with Type 1 diabetes, and when Type 2 diabetes is not controlled by oral antidiabetic medicines, insulin is also used in Type 2 diabetes. However, despite this use, there is still increased mortality and morbidity in subjects with diabetes, compared to subjects without diabetes. One of the factors, which may be involved in this increased mortality and morbidity in subjects with diabetes, is nonadherence to insulin. Nonadherence rates to insulin are in the range of 20–38%, and many factors contribute to the nonadherence. The major aim of the review was to determine whether interventions to improve adherence to insulin do actually improve adherence to insulin. Most studies have shown that adherence to insulin was improved by changing from the vial-and-syringe approach to prefilled insulin pens, but not all studies have shown that this translated into better glycemic control and clinical outcomes. The results of studies using automatic telephone messages to improve adherence to insulin to date are inconclusive. There is limited and variable evidence that an intervention by a nurse/educator, which discusses adherence to medicines, does improve adherence to insulin. In contrast, there is little or no evidence that an extra intervention by a doctor or an intervention by a pharmacist, which discusses adherence to insulin, does actually improve the measured adherence to insulin. In conclusion, rather than assuming that an intervention by a health professional discussing adherence to insulin actually improves adherence to insulin, long-term studies investigating this are required.

Keywords: adherence, diabetes, health professional, insulin, telephone.

Meta-Analysis
ORIGINAL ARTICLE

Interventions With Adherence-Promoting Components in Pediatric Type 1 Diabetes

Meta-analysis of their impact on glycemic control

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JENNIFER M. ROHAN, MA
CLAIRE M. PETERSON, MA
DENNIS DROTAR, PHD

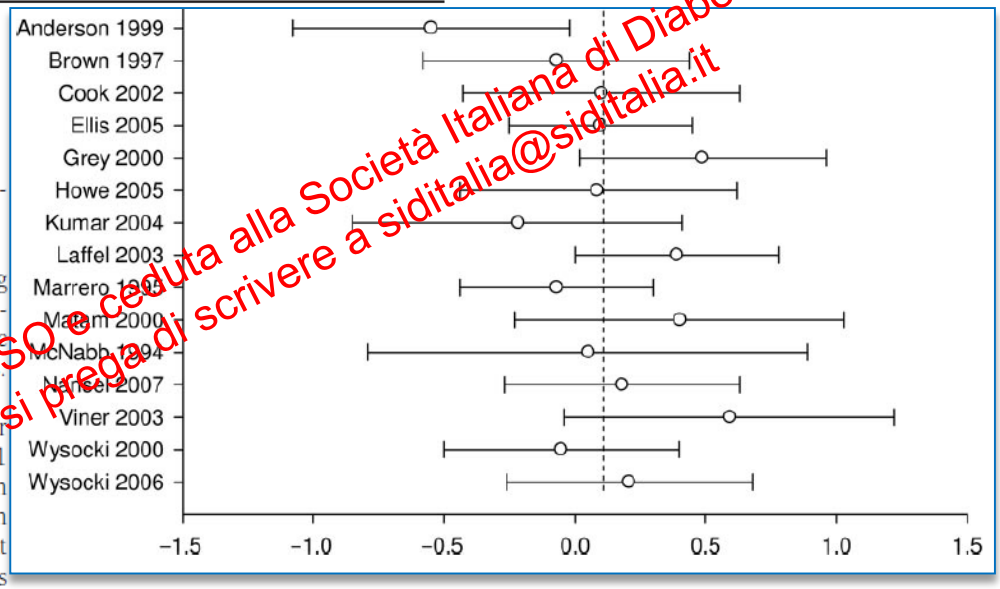
OBJECTIVE — To review interventions with adherence-promoting components and document their impact on glycemic control via meta-analysis.

RESEARCH DESIGN AND METHODS — Data from 15 studies that met the following criteria were subjected to meta-analysis: *1*) randomized, controlled trial, 2) study sample included youth aged <19 years, *3*) youth had type 1 diabetes, *4*) study reported results on glycemic control; and *5*) study reported use of adherence- or self-management–promoting components.

RESULTS — The 15 studies included 997 youth with type 1 diabetes. The mean effect size for pre- to posttreatment change for the intervention versus control group comparison was 0.11 (95% CI −0.01 to 0.23). This is a small effect, demonstrating very modest improvements in glycemic control. However, analysis for the pre- to posttreatment effect for the intervention group alone did show significant variability [$Q(14) = 33.11$; $P < 0.05$]. Multicomponent interventions, those that targeted emotional, social, or family processes that facilitate diabetes management, were more potent than interventions just targeting a direct, behavioral process (e.g., increase in blood glucose monitoring frequency).

CONCLUSIONS — Interventions that focus on direct, behavioral processes and neglect emotional, social, and family processes are unlikely to have an impact on glycemic control; multicomponent interventions showed more robust effects on A1C. Future clinical research should focus on refining interventions and gathering more efficacy and effectiveness data on health outcomes of the pediatric patients treated with these interventions.

Diabetes Care 33:1658–1664, 2010



The mean effect size for the pre- to post-treatment change in glycemic control for the intervention group was 0.13, with individual study effects ranging from

Viana *et al. Trials* (2016) 17:94
DOI 10.1186/s13063-016-1207-6

Trials

RESEARCH Open Access

Interventions to improve patients' compliance with therapies aimed at lowering glycated hemoglobin (HbA1c) in type 1 diabetes: systematic review and meta-analyses of randomized controlled clinical trials of psychological, telecare, and educational interventions

Luciana Verçoza Viana[1*], Marilia Brito Gomes[2], Lenita Zajdenverg[3], Elizabeth Joaquim Gravin[4], Mirela Jobim Azevedo[1] and On Behalf of the Brazilian Type 1 Diabetes Study Group (BrazDiab1SG)

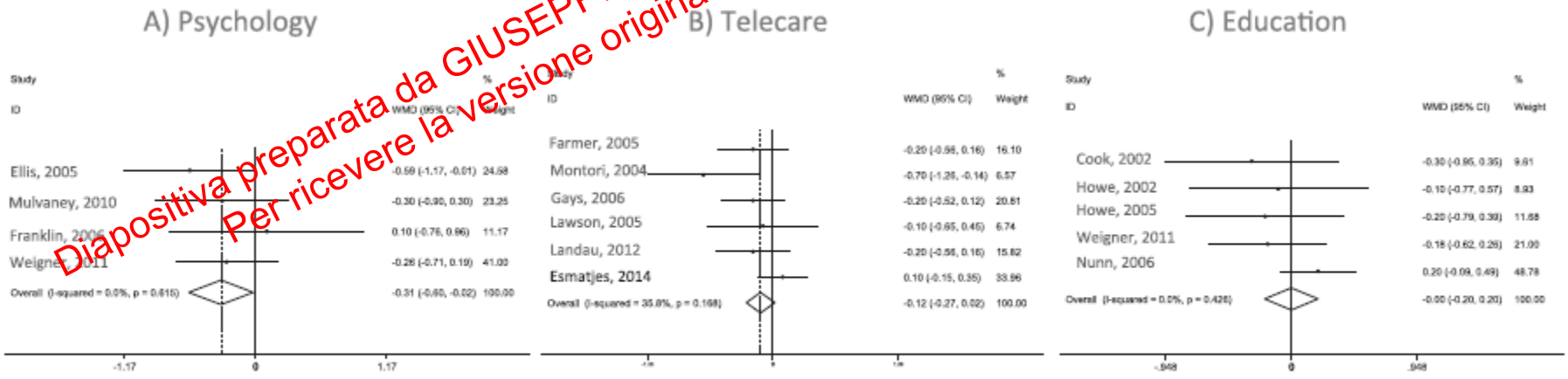


Fig. 2 Forest plots of interventions to improve compliance with lower glycated hemoglobin (HbA1c) in patients with type 1 diabetes: **a** Psychological. **b** Telecare. **c** Education categories

Annals of Internal Medicine | REVIEW

Interventions to Improve Adherence to Self-administered Medications for Chronic Diseases in the United States

A Systematic Review

Diverse strategie per migliorare l'aderenza

Meera Viswanathan, PhD; Carol E. Golin, MD; Christine D. Jones, MD, MS; Mahima Ashok, PhD; Susan J. Blalock, MPH, PhD; Roberta C.M. Wines, MPH; Emmanuel J.L. Coker-Schwimmer, MPH; David L. Rosen, MD, PhD; Priyanka Sista, BA; and Kathleen N. Lohr, PhD

Appendix Table 3. **Summary of Strength of Evidence, by Intervention Type***

Intervention Type	Diabetes	Hyperlipidemia	Hypertension	Heart Failure	Myocardial Infarction	Asthma	Depression	Glaucoma	Multiple Sclerosis	Musculoskeletal Diseases	Multiple or Unspecified Conditions
Blister packaging			MA, persistence†: L (+)								
Case management	MA: L (+)		MA: L (+)	MA: L (+)			MA: M (+)			MA: I	Persistence†: L (−)
Case management preceded by intensive interdisciplinary assessment											MA: I
Collaborative care (telephone and in person)	MA: L (+)	MA: I	MA: L (−)				MA: M (+)				
Collaborative care (telephone only)							MA: I				
Decision aids		MA: I								MA, persistence†, initiation of therapy: I	
Education (face-to-face with pharmacist)			MA: L (+) Persistence†: I								
Education and behavioral support (telephone, mail, and/or video)		MA: L (+)	MA: L (+)	MA: L (+)	MA: L (+) Persistence†: I						
Education and social support	MA: I		MA: I								
Health coaching	MA: I										
Multicomponent interventions		MA: I		MA: L (+)				MA: L (+)			
Pharmacist or physician access to patient adherence data						MA: L (−)					
Patient access to medical records				MA: I							
Reminders				MA: L (+)			MA: L (+)				
RN communication			MA: I								
Self-management						MA: M (+)					
Shared or clinical decision making						MA: L (+)					
Telephone counseling, care management, and monitoring	MA: I						MA: I		MA: L (+)	MA: I	
Virtual clinic										MA: L (+)	

I = insufficient; L (−) = low strength of evidence of no benefit; L (+) = low strength of evidence of benefit; M (+) = moderate strength of evidence of benefit; MA = medication adherence (with respect to timing, dosage, or frequency as prescribed).

* Blank cells indicate no evidence.

† In continuing treatment for the prescribed duration.

Patient Preference and Adherence

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REVIEW

Integrated insulin pump therapy with continuous glucose monitoring for improved adherence: technology update

Andrea Tumminia[1]
Laura Sciacca[1]
Lucia Frittitta[1]
Sebastiano Squatrito[1]
Riccardo Vigneri[2]
Rosario Le Moli[1]
Letizia Tomaselli[2]

Abstract: Insulin pump therapy combined with real-time continuous glucose monitoring, known as sensor-augmented pump (SAP) therapy, has been shown to improve metabolic control and to reduce the rate of hypoglycemia in adults with type 1 diabetes compared to multiple daily injections or standard continuous subcutaneous insulin infusion. Glycemic variability is also reduced in patients on SAP therapy. This approach allows patients to monitor their glucose levels being informed of glycemic concentration and trend. Trained diabetic patients, therefore, can appropriately modify insulin infusion and/or carbohydrate intake in order to prevent hypo- or hyperglycemia. For these reasons, SAP therapy is now considered the gold standard for type 1 diabetes treatment. To be clinically effective, however, devices and techniques using advanced technology should not only have the potential to theoretically ameliorate metabolic control, but also be well accepted by patients in terms of satisfaction and health-related quality of life, because these factors will improve treatment adherence and consequently overall outcome. SAP therapy is generally well tolerated by patients; however, many clinical trials have identified significant noncompliance in the use of this device, most notably in the pediatric and adolescent populations. In this review we aim to analyze the main reasons for good or poor adherence to SAP therapy and to provide useful tips in order to fully benefit from this kind of novel therapeutic approach.

Patient Preference and Adherence 2015:9 1263–1270

DIABETES RESEARCH AND CLINICAL PRACTICE 150 (2019) 27–37

Contents available at ScienceDirect

Diabetes Research and Clinical Practice

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

Mobile phone text messaging in improving glycaemic control for patients with type 2 diabetes mellitus: A systematic review and meta-analysis ☆

Rabbia Haider[a,b,*], *Likhitha Sudini*[a], *Clara K. Chow*[a,b], *N. Wah Cheung*[a,b]

Fig. 2 – Meta-Analysis of Text Messaging Interventions on HbA1c. Overall, the mean difference in HbA1c between intervention and control was -0.38% (95%CI - 0.531, - 0.234, p-value <0.001).

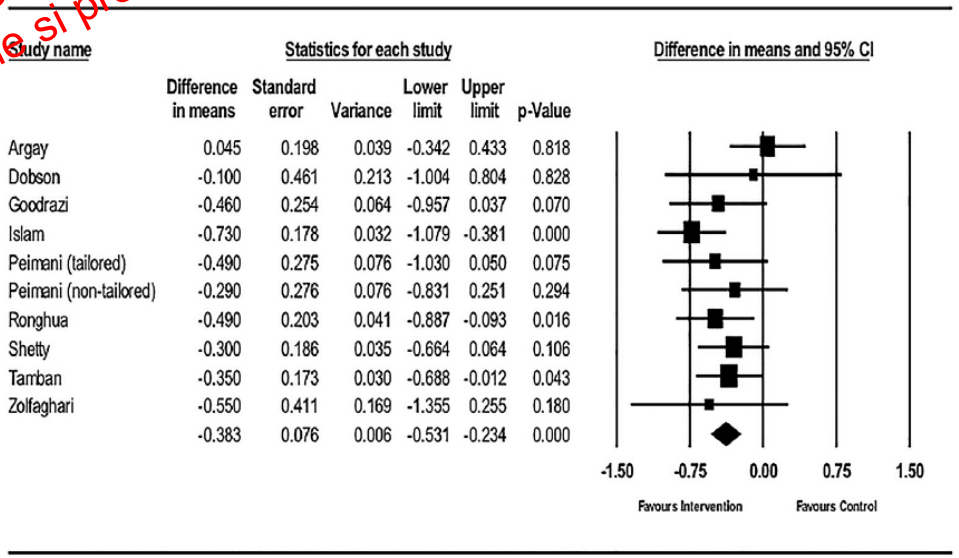
A B S T R A C T

Background: Mobile health is the use of mobile technology in developing healthcare, with the aim of reminding and motivating patients to adopt a healthy lifestyle. We conducted a systematic review assessing the effectiveness of text-messaging interventions on HbA1c in patients with Type 2 diabetes mellitus (T2DM).

Methods: Two authors independently searched MEDLINE, Embase, CINAHL, Cochrane Register of Randomized Control Trials and PsychInfo. The review included randomized control trials with at least 4 weeks follow up, evaluating the effect of text messaging on HbA1c, in patients with T2DM. Trials involving participants with Type 1 diabetes mellitus, pre-diabetes or gestational diabetes, or other forms of telemedicine were excluded. Studies employing bi-directional messaging were excluded.

Results: 208 papers were identified as meeting inclusion criteria and their abstracts reviewed. Of these, we examined the full text article of forty-four studies. Eleven randomized controlled trials were included in the final review, with a total of 1710 participants. One study focused on medication adherence only, while the remaining had educational and motivational messages. Five studies showed a significant improvement in HbA1c with the intervention. The remaining studies demonstrated a trend to improvement in HbA1c. Our meta-analysis on 9 of the 11 studies found an overall reduction in HbA1c of 0.38% (−0.53; −0.23, p-value <0.001).

Conclusion: Lifestyle-focused text messaging is a low cost initiative aimed at motivating patients with T2DM to adhere to a healthy lifestyle. We demonstrate that lifestyle focused text messaging is effective, with a significant improvement in HbA1c in the meta-analysis.



Journal of Diabetes

Journal of Diabetes 9 (2017), 596–605

ORIGINAL ARTICLE

Exploring the role of the patient–physician relationship on insulin adherence and clinical outcomes in type 2 diabetes: Insights from the MOSAIc study†

Highlights

- Patient perceptions of the quality of their interactions with their physicians have a significant association with total diabetes-related distress. Diabetes-related distress and patient-physician interactions have a significant independent association with insulin adherence and HbA1c level.
- This study delineates specific aspects of the patient-physician interaction that are linked to diabetes-related distress, insulin adherence behavior, and glycemic control.

Bruno LINETZKY,[1] Dingfeng JIANG,[2] Martha M. FUNNELL,[3] Bradley H. CURTIS[2] and William H. POLONSKY[4,5]

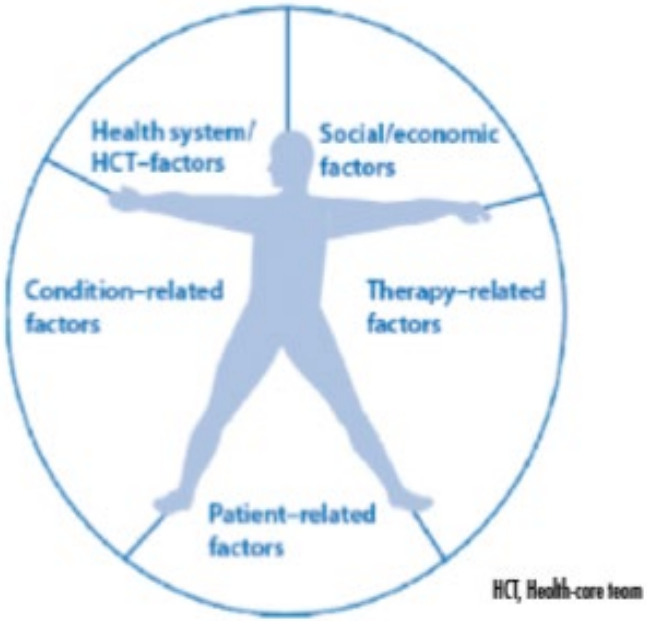
with a 0.171% and 0.145% increase in HbA1c, respectively.

Conclusions: Patients distressed about living with T2D, and dissatisfied with aspects of their interactions with physicians, exhibited poor insulin adherence. Perceived physician inattention and lack of engagement (and diabetes-related distress) directly affect insulin adherence and glycemic control.

Manifesto

PER L'ADERENZA ALLA TERAPIA FARMACOLOGICA SUL TERRITORIO ITALIANO

Il "Manifesto per l'aderenza alla terapia farmacologica sul territorio italiano" è il risultato dell'attività svolta da un Advisory Board, costituito da alcuni protagonisti del sistema sanitario, volta a promuovere l'aderenza terapeutica con particolare riguardo alle malattie croniche, attraverso l'adozione di politiche, modelli e comportamenti virtuosi gennaio 2013



Cochrane Library

Cochrane Database of Systematic Reviews

Interventions to improve safe and effective medicines use by consumers: an overview of systematic reviews (Review)

Ryan R, Santesso N, Lowe D, Hill S, Grimshaw J, Prictor M, Kaufman C, Cowie G, Taylor M

TOPICS

- medicines self-monitoring and self-management programmes appear generally effective
- interventions involving pharmacists in medicines management, such as medicines reviews and pharmaceutical care services (consultation between pharmacist and patient to resolve medicines problems: positive effects on adherence
- practical strategies like reminders, cues and/or organisers, reminder packaging and material incentives: with positive, although somewhat mixed effects on adherence
- simplified dosing regimens: with positive effects on adherence
- **education, counselling, support, training** or enhanced follow-up: with positive effects on adherence, medicines use, clinical outcomes and knowledge, but with mixed effects in some studies

Published in final edited form as:
Curr Opin Pediatr. 2010 August ; 22(4): 405–411. doi:10.1097/MOP.0b013e32833a46a7.

Adherence challenges in the management of type 1 diabetes in adolescents: prevention and intervention

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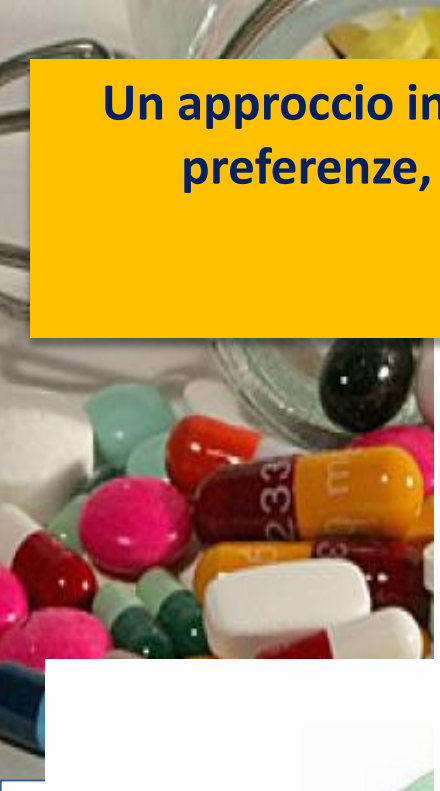
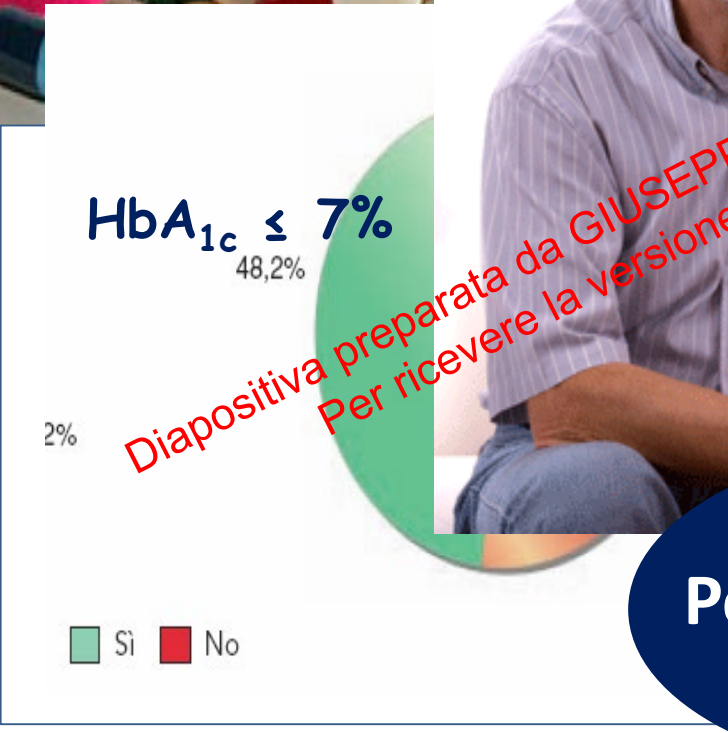
Figure 1. Constellation of factors that influence treatment adherence in adolescents with type 1 diabetes

Although adherence directly influences glycemic control measured as HbA1c, there is a constellation of factors that impacts adherence in adolescents with type 1 diabetes. These include unmodifiable factors such as age and duration of diabetes and modifiable factors such as diabetes-specific family conflict, family involvement, and implementation of technologies for diabetes management. The overall aim is to achieve target glycemic control with HbA1c values of less than 7.5% for teens with diabetes in order to preserve health and prevent long-term complications of the disease. HbA1c, hemoglobin A1c.

Un approccio incentrato sul paziente facilita l'identificazione delle eventuali preferenze, aspettative che possono motivare il paziente a fare la terapia migliorando in maniera significativa l'aderenza





Personalizzazione