


CDE-Ambassador A Novel Approach To Comprehensive Diabetes Care At The Primary Care Level

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CDE-Ambassador A Novel Approach To Comprehensive Diabetes Care At The Primary Care Level

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Objective

To determine whether the participation of a certified diabetes educator actively guided by a diabetologist (CDE Ambassador, CDE-A) working with physicians at the primary care level to interact and teach patients with type 2 diabetes improves glycemic control and other indices of cardiovascular risk

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Facts

- ❖ According to the CDC-Diabetic leadership initiative, the estimated prevalence of diagnosed and undiagnosed in the United states in 2012 was 29.1 million or 9.3% of the populations
- ❖ If current trends continue, as many as 1 in 3 adults will have diabetes by the year 2050
- ❖ Diabetes was among the top ten most costly conditions in terms of health care expenditures for both women and men in 2008

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Facts

- ❖ The American Diabetes Association in 2013 estimated the total costs of diagnosed diabetes have risen to **\$245 billion** in 2012 from **\$174 billion** in 2007, when the cost was last examined
- ❖ People with diagnosed diabetes incur average medical expenditures of about **\$13,700** per year, of which about **\$7,900** is attributed to diabetes
- ❖ **1 in 10** health care dollars is spent treating diabetes and its complications

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Patients & Methods

- ❖ This is a Retrospective review of patients with type 2 diabetes who were managed by their primary care provider and whose treatment was further organized/modified by a CDE-A
- ❖ These patients were not seen by an endocrinologist during that period and for at least 3 years prior to inclusion in this management plan
- ❖ A CDE-A was attached to this primary care group to advise/guide the management of diabetic patients in collaboration with the primary care physicians (PCP's)

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Patients & Methods

- ❖ The initial training of the CDE-A's was for a period of 3 months by the endocrinologists
- ❖ Following the initial training period, the CDE-A continued to be in regular consultation with the endocrinologists in case further advice was needed
- ❖ Any changes to the anti-diabetic regimen that was suggested by the CDE-A had to be authorized by the PCP

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Patients & Methods

- ❖ The first consecutive 100 subjects who were referred and seen by CDE-A were included in this analysis
- ❖ The start date was the first visit with the CDE-A (i.e. intervention visit)
- ❖ The follow up visit date was the first scheduled visit with their physician following the intervention
- ❖ The last set of HbA1c and labs done prior to intervention was used as baseline data for the purpose of the analysis

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Patients & Methods

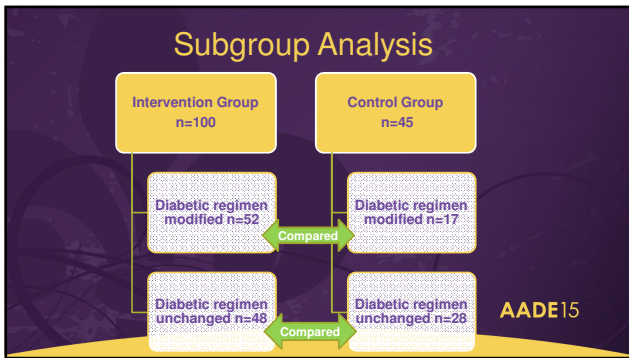
- ❖ Most patients met with the CDE-A twice during that period
- ❖ Follow up data (weight, BP) was documented on the date of follow up with PCP
- ❖ Follow up laboratory values were collected around the date of follow up
- ❖ Another group of 45 patients who had not been referred to the CDE-A and were managed by the PCP's alone over the same period were used as the controls

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Baseline characteristics	Intervention group N (%)	Control group	P-Value
Sample Size (N)	100	45	
Mean Age(Years)	58 ±10	61 ±12	0.172
Female (%)	54 (54%)	23 (51%)	0.751
Diabetes Duration(years):	4.5 ± 5.4	5.7 ± 4.1	0.206
<5 years	62 (62 %)	19 (42.2 %)	0.027
5-10 years	28 (28 %)	24 (53.3 %)	0.003
>10 years	10 (10 %)	2(4.4 %)	0.343
Mean Duration of follow-up	132 ±107 days (4.4 ±3.6 months)	139 ± 64 days (4.6 ±2.1 months)	0.704
Anti-Diabetic Regimen	Intervention group N (%)	Control group	P-Value
None	26 (26%)	5 (11%)	0.043
Metformin	64 (64%)	33 (73%)	0.269
Sulfonylureas	20 (20%)	12 (27%)	0.371
Thiazolidinedione	3 (3 %)	7 (16%)	0.010
GLP-1 Agonists	4 (4%)	4 (9%)	0.254
DPP-4 inhibitor	5 (5%)	4 (9%)	0.459
Long acting Insulin	14 (14 %)	9 (20%)	0.254
Short acting Insulin	6 (6 %)	4 (9%)	0.724
Combination of the above	30 (30%)	22 (49%)	0.028

Results				
Intervention group (N=100)	Before	After	Mean change	P Value
Weight (kg)	102±22	99±22	-2.8 ± 4.4	<.0001
BMI (kg/m ²)	36±7	35±7	-0.96 ± 1.7	<.0001
HbA1c (%)	8.4±2.2	6.8±1.2	-1.6 ± 2.1	<.0001
SBP (mmHg)	134±17	128±13	-6 ± 17	0.002
DBP (mmHg)	80±10	77±9	-3 ± 10	0.003
LDLc (mg/dl)	108±36	96±36	-12 ± 30	0.0004
Triglycerides(mg/dl)	189±121	162±90	-27 ± 80	0.003
Microalbuminuria (mg/mg)	64±536	27±153	-38 ± 385	0.329
Control group (N=45)	Before	After	Mean change	P Value
Weight (kg)	98.4±24	97.7±25	-0.66± 2.6	0.089
BMI (kg/m ²)	34.3± 7.3	34.1 ± 7.5	-0.22±0.9	0.092
HbA1c (%)	8.1± 1.5	7.86± 1.2	-0.26± 1.2	0.151
SBP (mmHg)	131± 17	133 ± 17	3 ± 19	0.384
DBP (mmHg)	75±9	77±12	2±11	0.229
LDLc (mg/dl)	95.8± 41	95.6± 35	-0.18±22	0.960
Triglycerides (mg/dl)	206.5± 144	206.7± 105	0.17±80	0.992
Microalbuminuria (mg/mg)	78± 273	33±188	-45±288	0.295

Results		
Anti-diabetic regimen	Intervention group (%)	Control group (%)
No change	48 (48%)	28 (62%)
Metformin added or increased	30 (30%)	3 (7%)
Sulfonylurea	11 (11%)	3 (7%)
Added	0	1 (2%)
Stopped	0	3 (7%)
GLP1 agonist added	5 (5%)	3 (7%)
Long acting insulin dose:	11 (11%)	3 (7%)
Increased/added	2 (2%)	0
Decreased	1 (1%)	0
Short acting insulin stopped	1 (1%)	0
SGLT2 added	1 (1%)	0
Thiazolidinedione added	0	2 (4%)
DPP-4 added	0	3 (7%)
Meglitinide added	0	1 (2%)
Multiple medication changes	7 (7%)	2 (4%)
Statin Therapy	Intervention group (%)	Control group (%)
No statin	47 (47%)	12 (27%)
Statin started within a month of intervention start date	3 (3%)	3 (7%)
Statin Dose Unchanged	48 (48%)	26 (58%)
Statin Dose Changed	0	3 (7%)
Statin Stopped	0	1 (2%)
Unclear documentation	2 (2%)	0



Baseline characteristics in patients whose anti-diabetic treatment was modified			
	Intervention subgroup (%)	Control subgroup (%)	P-Value
Numbers	52	17	
Mean Age	56±9	58±12	0.106
Female (%)	27 (52%)	10 (59%)	0.617
Diabetes Duration(years)	4.1±4.4	4.9 ± 3.4	0.468
Mean Duration of follow-up	149 ± 134 days (5 ± 4.5 months)	129 ± 64 days (4.3 ± 2.1 months)	0.557
Anti-Diabetic Regimen			
None	11 (21%)	2 (12%)	0.495
Metformin	35 (67%)	12 (71%)	0.807
Sulfonylureas	11 (21%)	6 (35%)	0.331
Thiazolidinedione	1 (2%)	4 (24%)	0.012
GLP-1 Agonists	2 (4%)	3 (18%)	0.092
DPP-4 inhibitor	4 (8%)	2 (12%)	0.631
Long acting Insulin	8 (15%)	3 (18%)	1.0
Short acting Insulin	2 (4%)	1 (6%)	1.0
Combination of the above	17 (33%)	10 (59%)	0.055

Data from the Intervention and Control Groups whose anti-diabetic treatment was modified				
Intervention Group (n=52)	Before	After	Mean change	P Value
Weight(kg)	103±25	99.5±25	-3.7± 4.9	<.0001
BMI(Kg/m ²)	36.6±8	35.3±8	-1.3±1.9	<.0001
HbA1c (%)	8.9±2.4	6.9±1.2	-1.9 ± 2.0	<.0001
SBP(mmHg)	133±17	126±11	-8±16	0.001
DBP(mmHg)	80±9	76±8	-4±10	0.003
LDLc (mg/dl)	110±36	95±39	-15 ± 26	0.001
Triglycerides(mg/dl)	212±148	172±95	-40±81	0.123
Micro albuminuria (mg/mg)	9.8±19	9.6±17	-0.2±13	0.929
Control group (n=17)	Before	After	Mean change	P Value
Weight(kg)	97.3±22	97.1±22	-0.2±2.4	0.695
BMI(Kg/m ²)	34.1± 7	34 ± 7	-0.1±0.8	0.776
HbA1c (%)	8.4± 1.5	8± 1.5	-0.4±1.3	0.202
SBP(mmHg)	128± 15	130 ± 17	2±17	0.666
DBP(mmHg)	74±9	76±9	2±8	0.263
LDLc(mg/dl)	100± 27	97± 29	-3±22	0.653
Triglycerides(mg/dl)	267± 158	260± 112	-7±81	0.731
Micro albuminuria (mg/mg)	132± 418	65.7	-126±420	0.224

Baseline characteristics in patients who had no change in anti-diabetic regimen			
Baseline characteristics	Intervention subgroup (%)	Control subgroup	P-Value
Numbers	48	28	
Mean Age	61	61	0.944
Female (%)	27 (56%)	13 (46%)	0.409
Diabetes Duration(years):	Mean 5.1±6	Mean 6.2±4.5	0.377
Mean Duration of follow-up	115 ± 63 days (3.8 ± 2.1 months)	145 ± 64 days (4.8 ± 2.1 months)	0.047
Anti-Diabetic Regimen			
None	13 (27%)	3 (10%)	0.091
Metformin	28 (58%)	21 (75%)	0.224
Sulfonylureas	9 (19%)	6 (21%)	0.777
Thiazolidinedione	2 (4%)	3 (10%)	0.351
GLP-1 Agonists	1 (2%)	1 (4%)	1.0
DPP-4 inhibitor	1 (2%)	2 (7%)	0.551
Long acting Insulin	5 (10%)	6 (21%)	0.310
Short acting Insulin	4 (8%)	3 (10%)	1.0
Combination of the above	13 (27%)	12 (43%)	0.158

Data from the Intervention and Control Groups whose anti-diabetic treatment was not modified

Intervention group (n=48)	Before	After	Mean change	P Value
Weight(kg)	100±18	98±19	-1.9±3.6	0.001
BMI(Kg/m ²)	35.2±5	34.6±5	-0.6±1.3	0.002
HbA1c (%)	7.8±2.0	6.7±0.9	-1.1±2.1	0.001
SBP(mmHg)	134±17	131±15	-3±19	0.330
DBP(mmHg)	90±11	78±10	-2±11	0.232
LDLc(mg/dl)	107±37	98±34	-9±33	0.064
Triglycerides(mg/dl)	168±74	154±85	-14±80	0.244
Micro albuminuria (mg/mg)	123±773	45±220	-78±555	0.332
Control group (n=28)	Before	After	Mean change	P Value
Weight(kg)	98.9±25	98±26	-0.9± 2.7	0.897
BMI(Kg/m ²)	34.5± 8	34.2± 8	-0.32± 0.9	0.068
HbA1c (%)	7.95± 1.4	7.8 ± 1	-0.15±1.1	0.647
SBP(mmHg)	132± 17	135 ± 18	3±21	0.460
DBP(mmHg)	76±11	78±14	2±13	0.436
LDLc(mg/dl)	93± 47	95± 39	1.4±22	0.905
Triglycerides(mg/dl)	164± 128	169± 85	5±82	0.760
Micro albuminuria (mg/mg)	45± 115	48±238	4±153	0.898

HIGHLIGHTS OF RESULTS

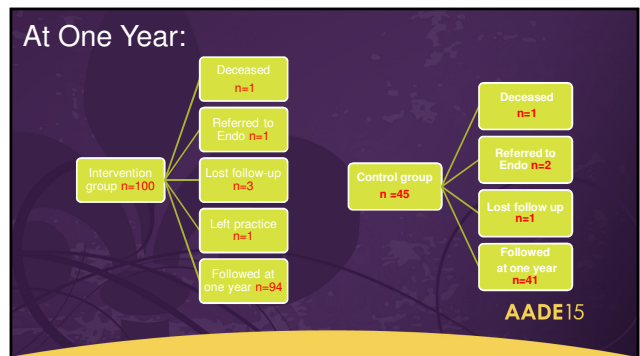
- ❖ In the CDE-A intervention group, HbA1c fell by **1.6±2.1%** with a fall of **1.9±2.0%** in those in whom anti-diabetic treatment was altered and by **1.1±2.1%** in whom drug therapy was not changed
- ❖ The reduction in all the parameters were significantly greater in the intervention group when compared to controls

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HIGHLIGHTS OF RESULTS

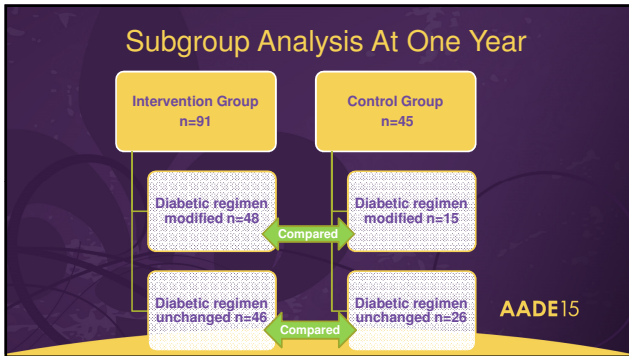
- ❖ In the intervention group, the anti-diabetic regimen was modified in **52%** of the subjects as compared to **38%** in the control group
- ❖ It is interesting that while **78%** of the patients managed by PCP alone continued to remain uncontrolled, recommendations of a CDE authorized by the same PCP providers resulted in majority (**69%**) of the uncontrolled patients in the intervention arm achieving an **HbA1c of < 7%**. This suggests that the clinical inertia of the PCP's can be improved by the CDE-A intervention.

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Baseline characteristics	Intervention group N (%)	Control group N (%)	P-Value
Sample Size (N)	94	41	
Mean Age(Years)	58 ±10	61±11	0.139
Female (%)	53 (56%)	20 (49%)	0.563
Diabetes Duration(years):	4.4 ± 5.5	5.3 ± 3.9	0.271
<5 years	60 (64%)	18 (44%)	0.0004
5-10 years	25 (27%)	22 (54%)	0.045
>10 years	9 (9%)	1 (2%)	0.431
Mean Duration of follow-up	406 ± 94 days (13.5 ±3.1 months)	385 ± 53 days (12.8 ± 1.8 months)	0.192
Anti-Diabetic Regimen	Intervention group	Control group	P-Value
None	25 (27%)	5 (12%)	0.040
Metformin	59 (63%)	30 (73%)	0.244
Sulfonylureas	19 (20%)	10 (24%)	0.590
Thiazolidinedione	3 (3%)	7 (17%)	0.030
GLP-1 Agonists	3 (3%)	4 (9%)	0.197
DPP-4 inhibitor	4 (4%)	2 (4%)	0.873
Long acting Insulin	13 (14%)	7 (17%)	0.632
Short acting Insulin	5 (5%)	2 (4%)	0.913
Combination of the above	26 (28%)	17 (41%)	0.093

Intervention group (N=94)	Results			
	Before	After	Mean change	P Value
Weight (kg)	102±22	98±21	-3.2 ± 6.7	<.0001
BMI (kg/m ²)	36±7	35±6	-1.1±2.3	<.0001
HbA1c (%)	8.5±2.3	7.3±2.0	-1.1±2.5	<.0001
SBP (mmHg)	133±16	129±16	-4±19	0.037
DBP (mmHg)	80±10	78±10	-2±11	0.064
LDLc (mg/dl)	109±39	100±40	-9±34	0.027
Triglycerides(mg/dl)	193±122	164±90	-30±68	0.0005
Microalbuminuria (mg/mg)	67±552	12±37	-56±554	0.334
Control group (N=41)	Before	After	Mean change	P Value
Weight (kg)	98.4±24	96.8±23	-1.6 ± 4.7	0.0395
BMI (kg/m ²)	34.2± 7.1	33.7 ± 7.0	-0.5±1.6	0.043
HbA1c (%)	8.1 ± 1.4	7.9 ± 1.5	-0.23± 1.6	0.412
SBP (mmHg)	131.1± 16	130.5 ± 18	-0.61 ± 22	0.858
DBP (mmHg)	75±10	75.3±13	0.27±10	0.866
LDLc (mg/dl)	103± 40	94± 31	-9±24	0.066
Triglycerides (mg/dl)	208± 136	205± 122	-2.8±85	0.886
Microalbuminuria (mg/mg)	85± 284	42±145	-43±287	0.338



Baseline characteristics of the subgroups.

Groups in which diabetic regimen modified	Intervention subgroup (%)	Control subgroup (%)	P-Value
Numbers	48	15	
Mean Age	56±9	60±12	0.110
Female (%)	25 (52%)	9 (60%)	0.598
Diabetes Duration(years)	3.8±4.3	4.2 ± 2	0.571
Mean Duration of follow-up	411 ± 111 days (13.7 ±3.7 months)	378 ±43 days (12.6 ±1.4 months)	0.090

Groups in which diabetic regimen not modified	Intervention subgroup (%)	Control subgroup (%)	P-Value
Numbers	46	26	
Mean Age	61 ±10	62 ±11	0.811
Female (%)	26 (56%)	11 (42%)	0.254
Diabetes Duration(years)	Mean 5.1±6.5	Mean 6.0±4.6	0.504
Mean Duration of follow-up	400±73 days (13.3 ±2.4 months)	390 ±59 days (13 ±2 months)	0.544

Data from the Intervention and Control Groups whose anti-diabetic treatment was modified

Intervention Group (n=48)	Before	After	Mean change	P Value
Weight(kg)	103±25	99±24	-3.7±7.2	0.0008
BMI(Kg/m ²)	36.3±8	35.2±7	-1.2±2.5	0.003
HbA1c (%)	9.2±2.4	7.8±2.5	-1.4 ±2.8	0.002
SBP(mmHg)	134±17	130±18	-3.7±21	0.232
DBP(mmHg)	81±9	78±10	-2.9±16	0.083
LDLc*(mg/dl)	114±40	99±42	-15 ±26	0.002
Triglycerides(mg/dl)	215±141	183±103	-32±75	0.013
Micro albuminuria (mg/mg)	8.3±14	5.6±8	-3±13	0.162

Control group (n=15)	Before	After	Mean change	P Value
Weight(kg)	99±23	98±23	-1±3.9	0.320
BMI(Kg/m ²)	35± 6.4	34 ± 6.5	-0.4±1.3	0.228
HbA1c (%)	8.6± 1.6	7.9± 1.2	-0.7±1.1	0.037
SBP(mmHg)	129± 16	130 ± 21	1±22	0.837
DBP(mmHg)	73±9	75±8	2±8	0.437
LDLc(mg/dl)	115± 23	100± 31	-15±31	0.225
Triglycerides(mg/dl)	227± 93	251± 121	25±98	0.450
Micro albuminuria (mg/mg)	149± 445	15±20	-134±450	0.269

Data from the Intervention and Control Groups whose anti-diabetic treatment was NOT modified

Intervention Group (n=46)	Before	After	Mean change	P Value
Weight(kg)	101±17	98±19	-2.6±5.9	0.005
BMI(Kg/m ²)	36±5	35±5	-0.9±2.1	0.005
HbA1c (%)	7.7±2.0	6.9±1.0	-0.9±2.3	0.015
SBP(mmHg)	133±15	128±14	-4.4±16	0.067
DBP(mmHg)	80±11	78±9	-1.3±11	0.411
LDLc*(mg/dl)	105±38	101±38	-4±41	0.593
Triglycerides(mg/dl)	170±73	143±68	-27±61	0.017
Micro albuminuria (mg/mg)	129±789	19±52	-110±792	0.352

Control group (n=26)	Before	After	Mean change	P Value
Weight(kg)	97.9±25	95.9±24	-1.9± 5.2	0.078
BMI(Kg/m ²)	33.9± 8	33.3± 7	-0.6± 1.8	0.108
HbA1c (%)	7.8± 1.2	7.9± 1.7	0.1±1.9	0.875
SBP(mmHg)	132± 17	131 ± 17	-1.6±22	0.707
DBP(mmHg)	76±11	75.4±15	-0.5±11	0.805
LDLc(mg/dl)	97± 36	90± 32	-7±20	0.198
Triglycerides(mg/dl)	196± 159	176± 117	20±74	0.301
Micro albuminuria (mg/mg)	48± 119	57±180	9±101	0.834

HIGHLIGHTS OF RESULTS

- ❖ Our data clearly show that the participation of the CDE-A, under the guidance of an endocrinologist at the primary care level led to a marked reduction in HbA1c, LDLc, triglycerides, blood pressure and body weight within 5 months
- ❖ These changes were dependent on changes in dietary habits and drug therapy including the addition or optimization in the doses of anti-diabetic drugs and insulin therapy

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HIGHLIGHTS OF RESULTS

- ❖ It is of interest that the changes in lipids occurred without any change in statin therapy, probably due to increased compliance
- ❖ The improvement in the HbA1c in the intervention group persisted after one year (mean drop of 1.1) and remained statistically significant in comparison to the control group (P = 0.0009)

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HIGHLIGHTS OF RESULTS

- ❖ There was a mean drop of 3.2 Kg and 1.1 in the BMI after one year in the intervention group. The weight loss and improvement in lipids remained statistically significant at one year after intervention
- ❖ The changes in glycemia, blood pressure, lipids and body weight would potentially result in a significant reduction in microvascular and macrovascular complications and improvement in the quality of life of these patients

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HIGHLIGHTS OF RESULTS

- ❖ In addition, it will reduce the magnitude of expenditure which currently occurs in the management of these complications
- ❖ We are now contemplating prospectively randomized studies comparing centers which are supported with CDE-A with those that are not and to study the durability of and cost saving related to these effects

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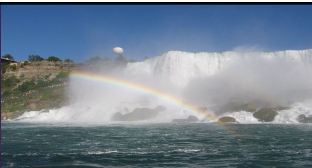
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