PIEMONTE

Ordine dei Farmacisti

FARMACIA di COMUNITÀ™

Università di Torino

Federfarma Piemonte

Verso una valutazione economica degli esiti

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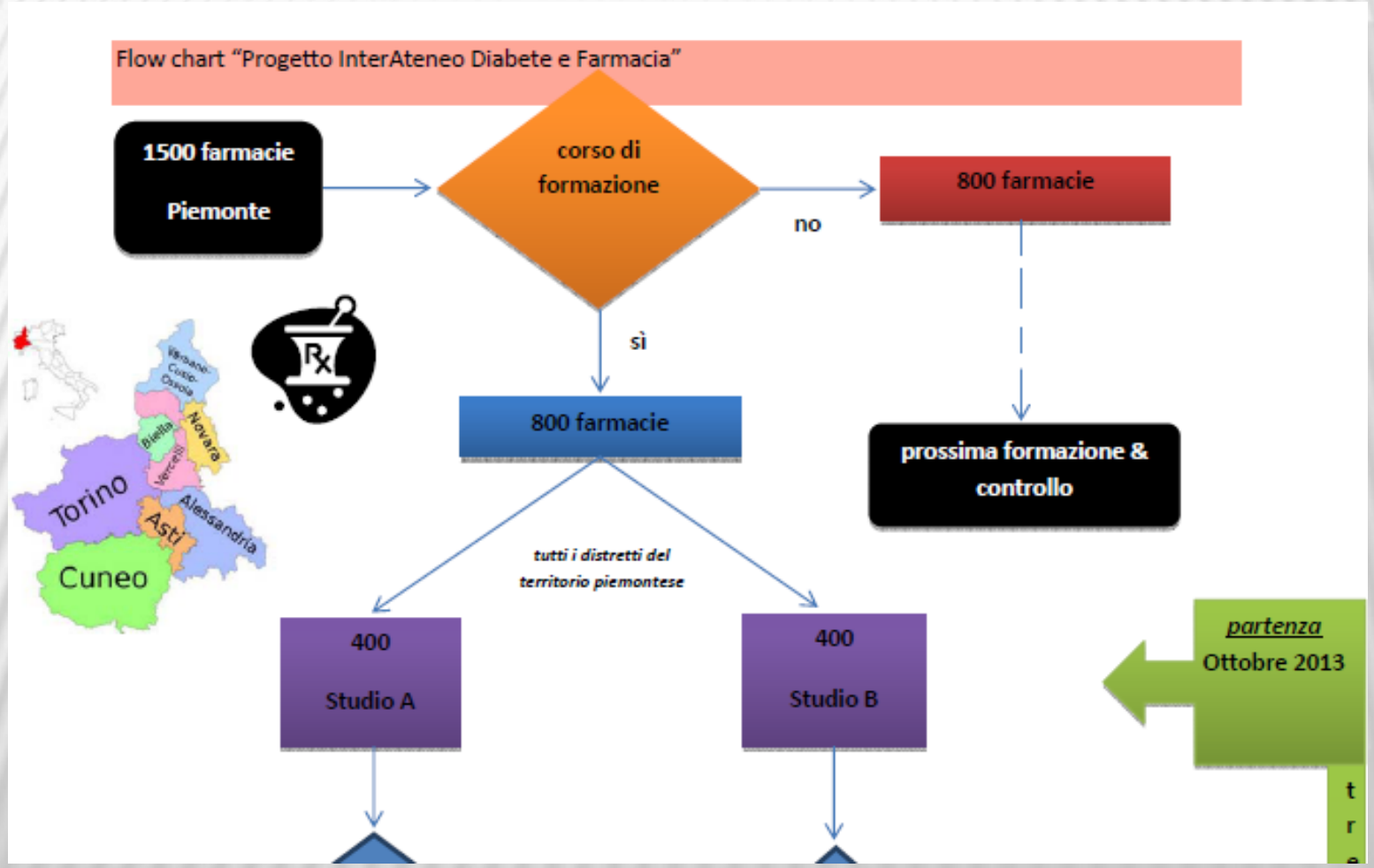
CORIPE PIEMONTE

Consorzio per la Ricerca e l'Istruzione Permanente in Economia - Piemonte

COME VALUTARE GLI ESITI ECONOMICI DEL PROGETTO “DIABETE E FARMACIA”?



IL MODELLO EMPIRICO

> Concentriamoci sull'**aderenza**: l'obiettivo è valutare l'impatto della policy "formazione ai farmacisti" su una serie di *outcome* clinici per arrivare ad una valutazione economica degli esiti

> Consideriamo un generico *outcome* **Y** (es.: il consumo di farmaci); sia **t** l'anno di implementazione della policy

> Per ciascun paziente "i" arruolato nel progetto, osserviamo Yi(t), Yi(t+1), …,Yi(t+x)

> Da fonti amministrative (Registro regionale pazienti diabetici) otteniamo informazioni su Yi(t-1) per i pazienti arruolati e su Yj(t-1), …., Yj(t+x) per un gruppo di pazienti non arruolati che frequentano farmacie diverse da quelle "trattate" (il gruppo di controllo)

IL MODELLO EMPIRICO: DIFF-IN-DIFF

	Gruppo di pazienti arruolati nelle farmacie che hanno seguito la formazione	**Gruppo di pazienti da Registro diabetici, farmacie "senza formazione"**
Dopo la policy	$Yi_1 \mid D_i=1$	$Yi_1 \mid D_i=0$
Prima della policy	$Yi_0 \mid D_i=1$	$Yi_0 \mid D_i=0$
	$(\bar{Y}_1 \mid D=1)-(\bar{Y}_0 \mid D=1)$	$(\bar{Y}_1 \mid D=0)-(\bar{Y}_0 \mid D=0)$

$$DiD=[(\bar{Y}_1 \mid D=1)-(\bar{Y}_0 \mid D=1)] - [(\bar{Y}_1 \mid D=0)-(\bar{Y}_0 \mid D=0)]$$

IL MODELLO EMPIRICO

> Una volta definita la DiD, possiamo poi tradurla in termini economici e attribuire la causa della variazione all'intervento di policy ➔ evidence based policy

> Il problema è che al momento non abbiamo ancora un gruppo di controllo, quindi non possiamo calcolare l'impatto della policy sulla spesa sanitaria

> Che cosa ci aspettiamo? Consideriamo una policy simile per la quale qualche valutazione c'è già

IL PROGETTO ASHEVILLE

- > E’ un programma di *Medication Therapy Management* sviluppato nella città di Asheville (NC, USA)
- > La città ha circa 70.000 abitanti; l’area metropolitana ne coinvolge circa 400.000, meno della metà della sola città di Torino

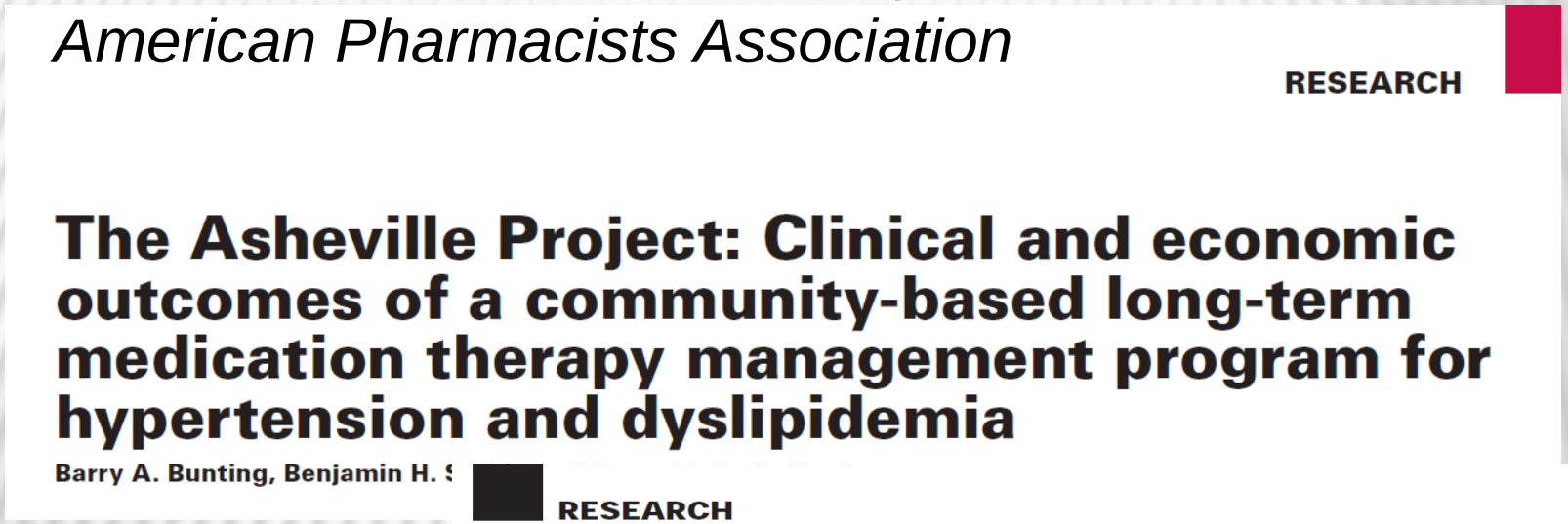
IL PROGETTO ASHEVILLE

- > L’accesso al programma è fornito dal datore di lavoro come ulteriore benefit rispetto alla copertura sanitaria
- > Parte dalla formazione (di pazienti e farmacisti), che vengono messi in team con farmacisti di comunità che hanno il compito di verificare il corretto uso dei medicinali

- > Per favorire la partecipazione al programma, gli imprenditori hanno finanziato corsi di formazione per farmacisti e i fornitori dei servizi per una riduzione dei *co-payment*

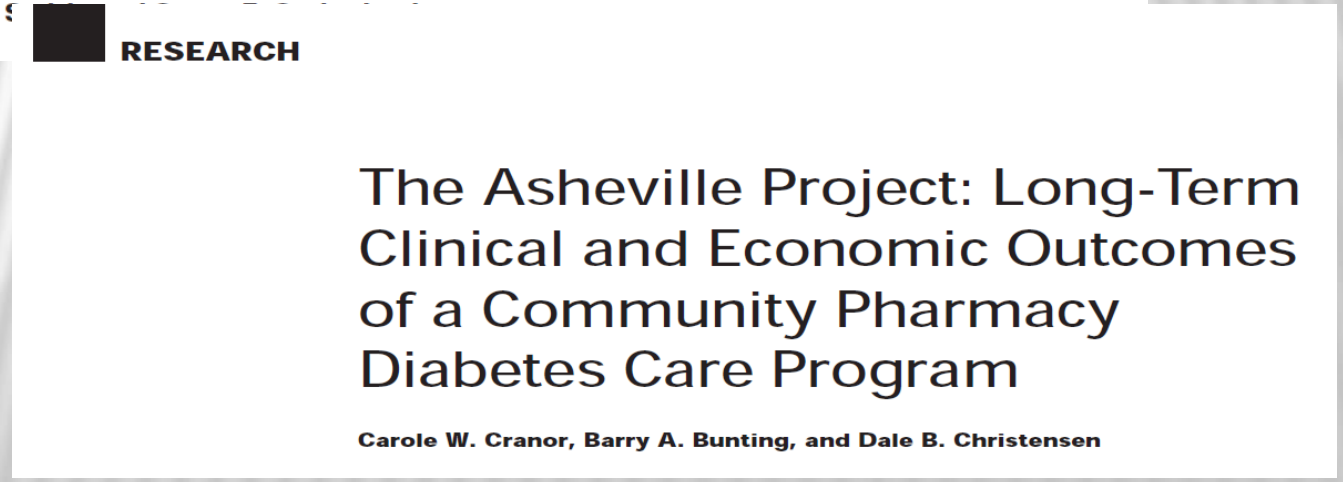
IL PROGETTO ASHEVILLE

- Le valutazioni degli outcomes clinici ed economici sono descritti in una serie di articoli pubblicati sul *Journal of the American Pharmacists Association*


RESEARCH

The Asheville Project: Clinical and economic outcomes of a community-based long-term medication therapy management program for hypertension and dyslipidemia

Barry A. Bunting, Benjamin H. S


RESEARCH

The Asheville Project: Long-Term Clinical and Economic Outcomes of a Community Pharmacy Diabetes Care Program

Carole W. Cranor, Barry A. Bunting, and Dale B. Christensen

DIABETE (JAPHA 2003)

- > fino a 5 anni di follow up, partendo dai primi pazienti arruolati nel 1997
- > 12 farmacie di comunità
- > Policy
  - a) formazione ai farmacisti
  - b) servizio di consulenza fornito dai farmacisti; visite a piedi, pelle, pressione, peso; eventuale invio al medico di base
- > Valutazioni degli esiti clinici ed economici su 200 pazienti circa

DIABETE (JAPHA 2003)

- > **outcomes clinici osservati**: modifiche nei valori di emoglobina glicata A1c; colesterolo HDL/LDL

- > **outcomes economici osservati**: modifiche nei costi sanitari diretti riferibili ai pazienti sotto osservazione

DIABETE (JAPHA 2003)

- Outcomes clinici: emoglobina glicata (valore target <7%; indicazione *American Diabetes Association*)

Table 3. Changes Over Time in A1c Concentrations

Time of Measurement (n)	Baseline A1c (%)[a] Median Mean ± SD	Follow-up A1c (%)[a] Median Mean ± SD	Change From Baseline A1c (%)[b] Median Mean ± SD	*P*[c]	Patients Improved No. (%)
1st follow-up[d] (136)	7.6 7.9 ± 2.1	6.6 6.8 ± 1.3	–0.8 –1.1 ± 1.9	< .0001	102 (75.0)
2nd follow-up (81)	7.4 7.7 ± 2.0	6.5 6.7 ± 1.3	–0.7 –1.1 ± 1.9	< .0001	56 (69.1)
3rd follow-up (55)	7.2 7.7 ± 2.1	6.8 6.9 ± 1.1	–0.5 –0.9 ± 2.0	.002	37 (67.3)
4th follow-up (39)	7.1 7.7 ± 2.3	6.8 6.9 ± 1.2	–0.4 –0.8 ± 2.3	.07[e]	23 (59.0)
5th follow-up (26)	7.2 8.0 ± 2.6	6.9 7.1 ± 1.2	–0.4 –0.9 ± 2.7	0.26[e]	15 (57.7)
6th follow-up (16)	7.0 8.0 ± 2.8	6.7 6.8 ± 0.9	–0.8 –1.2 ± 2.8	.13[e]	11 (68.8)
7th follow-up (11)	8.0 7.9 ± 1.9	6.8 6.8 ± 0.8	–1.0 –1.1 ± 1.7	.05	9 (81.8)

A1c = glycosylated hemoglobin; SD = standard deviation.
[a]Expected range in people without diabetes is 4.4%–6.4%; target range for people with diabetes is < 7.0%.
[b]Follow-up minus baseline (a negative number indicates improvement over baseline).
[c]Wilcoxon signed rank test for paired data (H0: difference = 0). Unadjusted *P* values are shown. Using the Bonferroni adjustment for 7 tests, the significant *P* value would be .007 under the assumption that the critical value of *P* = .05 for only one test of significance.
[d]Follow-up periods defined as 6-month intervals following baseline.
[e]Power to detect a difference of 10% or more < .60.

DIABETE (JAPHA 2003)

- Outcomes clinici: emoglobina glicata (valore target <7%; indicazione *American Diabetes Association*)

Table 4. Number of Patients With Optimal A1c at Each Follow-up[a]

Time of Measurement (n)	Baseline A1c No. (%)	Follow-up A1c No. (%)	Change From Baseline[b] No. (% Change)	*P*[c]
1st follow-up[d] (136)	52 (38.2)	85 (62.5)	33 (24.3)	< .0001
2nd follow-up (81)	32 (39.5)	54 (66.7)	22 (27.2)	.0001
3rd follow-up (55)	23 (41.8)	33 (60.0)	10 (18.2)	.02
4th follow-up (39)	18 (46.2)	21 (53.8)	3 (7.7)	.44[e]
5th follow-up (26)	12 (46.2)	14 (53.9)	2 (7.7)	.53[e]
6th follow-up (16)	8 (50.0)	10 (62.5)	2 (12.5)	.41[e]
7th follow-up (11)	5 (45.5)	7 (63.6)	2 (18.2)	.32[e]

A1c = glycosylated hemoglobin.
[a]Optimal value < 7%.
[b]Follow-up minus baseline.
[c]McNemar χ^2 (H0: change = 0). Unadjusted *P* values are shown. Using the Bonferroni adjustment for 7 tests, the significant *P* value would be .007 under the assumption that the critical value of $P = .05$ for only one test of significance.
[d]Follow-up periods defined as 6-month intervals following baseline.
[e]Power to detect a difference of 10% or more < .50.

DIABETE (JAPHA 2003)

- Outcomes clinici: LDL (valore target <100; indicazione *American Diabetes Association*)

Table 5. Changes Over Time in LDL-C Concentrations

Time of Measurement (n)	Baseline LDL-C (mg/dL)[a] Median Mean ± SD	Change From Baseline LDL-C (mg/dL)[b] Median Mean ± SD	P[c]	Patients Improved No. (%)
1st follow-up[d] (122)	110 116 ± 37.9	–2.5 –4.2 ± 32.2	.13[e]	65 (53.3)
2nd follow-up (70)	110 115 ± 38.5	–4.5 –6.5 ± 34.8	.16[e]	38 (54.3)
3rd follow-up (43)	108 109 ± 39.0	–7 –9.3 ± 30.3	.05[e]	26 (60.5)
4th follow-up (29)	104 105 ± 44.2	–5 –6.4 ± 32.7	.41[e]	17 (58.6)
5th follow-up (19)	106 112 ± 44.8	–5 –3.2 ± 36.1	.72[e]	10 (52.6)
6th follow-up (12)	106 103 ± 53.5	–0.5 –8.3 ± 43.7	.53[e]	6 (50.0)
7th follow-up (9)	104 94 ± 58.5	–18 –6.4 ± 43.5	.37[e]	6 (66.7)

LDL-C = low-density lipoprotein cholesterol; SD = standard deviation.
[a]Optimal value < 100 mg/dL.
[b]Follow-up minus baseline (a negative number indicates improvement over baseline).
[c]Wilcoxon signed rank for paired data (H0: difference = 0). Unadjusted *P* values are shown. Using the Bonferroni adjustment for 7 tests, the significant *P* value would be .007 under the assumption that the critical value of *P* = .05 for only one test of significance.
[d]Follow-up periods defined as 6-month intervals following baseline.
[e]Power to detect a difference of 10% or more < .50.

DIABETE (JAPHA 2003)

- Outcomes clinici: HDL (valore target >45M, 55W; indicazione *American Diabetes Association*)

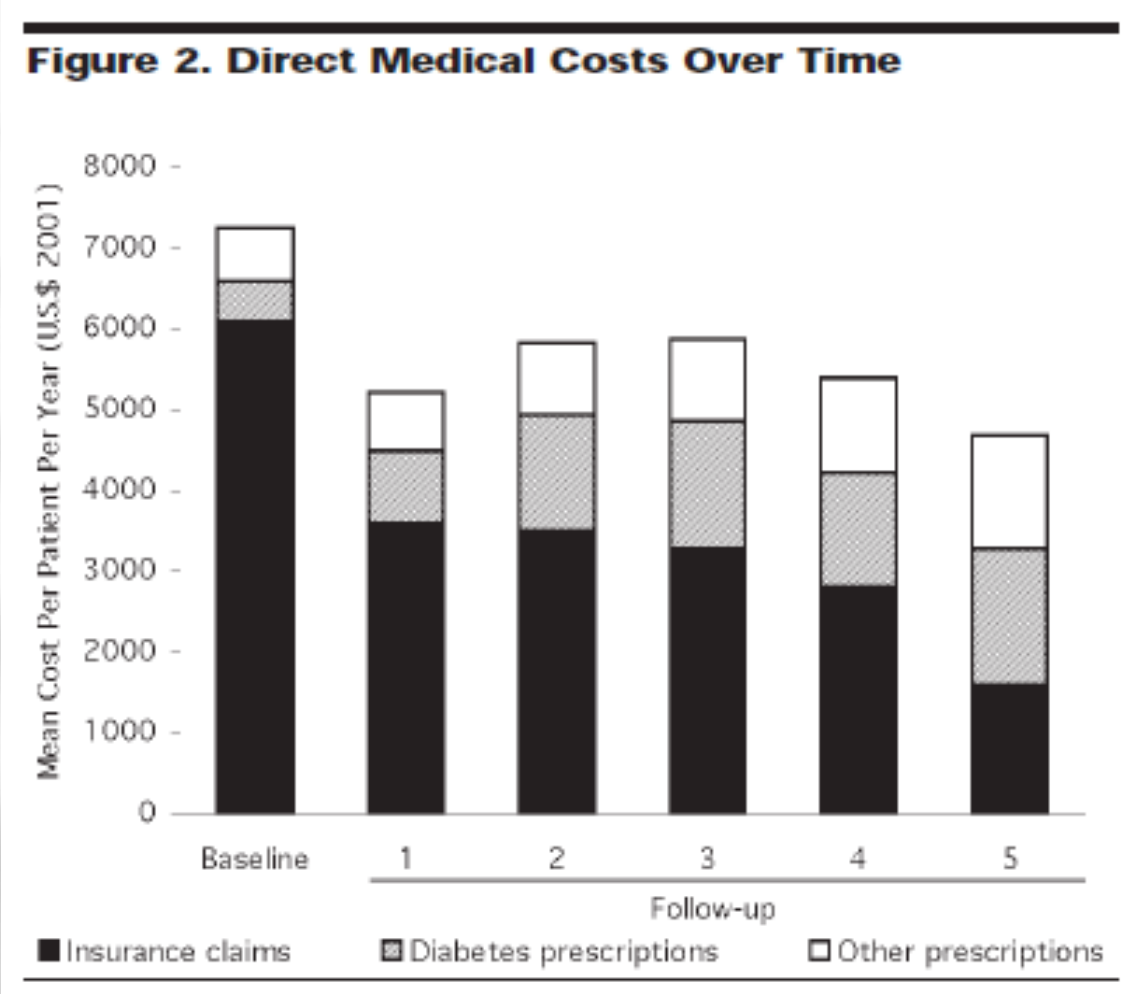
Table 7. Changes Over Time in HDL-C Concentrations

Time of Measurement (n)	Baseline HDL-C (mg/dL)[a] Median Mean ± SD	Change From Baseline HDL-C (mg/dL)[b] Median Mean ± SD	*P*[c]	Patients Improved No. (%)
1st follow-up[d] (124)	44.5 46 ± 13	1 1.10 ± 7.9	.05[e]	69 (55.7)
2nd follow-up (72)	44.5 46 ± 14	2 1.5 ± 7.8	.08[e]	41 (56.9)
3rd follow-up (46)	43 46 ± 16	2.5 1.9 ± 8.0	.04	27 (58.7)
4th follow-up (30)	44.5 46 ± 16	1 1 ± 7.8	.27[e]	16 (53.3)
5th follow-up (20)	44.5 48 ± 17	5 3.3 ± 11.4	.07[e]	15 (75.0)
6th follow-up (10)	47 46 ± 17	3.5 5.0 ± 6.8	.05[e]	7 (70.0)
7th follow-up (10)	44 46 ± 17	1.5 0.5 ± 6.9	.28[e]	6 (60.0)

HDL-C = high-density lipoprotein cholesterol; SD = standard deviation.
[a]Optimal value > 55 mg/dL for women and > 45 mg/dL for men.
[b]Follow-up minus baseline (a positive number indicates improvement over baseline).
[c]Wilcoxon signed rank test for paired data (H0: difference = 0). Unadjusted *P* values are shown. Using the Bonferroni adjustment for 7 tests, the significant *P* value would be .007 under the assumption that the critical value of *P* = .05 for only one test of significance.
[d]Follow-up periods defined as 6-month intervals following baseline.
[e]Power to detect a difference of 10% or more < .50.

DIABETE (JAPHA 2003)

- Outcomes economici:
- costi diretti



DIABETE (JAPHA 2003)

Table 10. Change From Baseline in Direct Medical Costs Over Time

	Insurance Claims		Prescription Claims Total		Prescription Claims Diabetes		Total Claims All Diagnoses	
Follow-up Time (n)[a]	Change $ PPPY[b]	≥ 10% Cost Decrease No. (%)	Change $ PPPY[b]	≥ 10% Cost Decrease No. (%)	Change $ PPPY[b]	≥ 10% Cost Decrease No. (%)	Change $ PPPY[b]	≥ 10% Cost Decrease No.(%)
1st follow-up (138)								
Median	−$90	66 (47.8)	$520	36 (26.3)	$218	35 (25.6)	$380	55 (40.2)
Mean ± SD	−$2,704 ± $13,056	—	$656 ± $1,199	—	$408 ± $828	—	-$1828 ± $12,898	—
P[c]	.19[d]	—	<.0001	—	<.0001	—	.57[d]	—
2nd follow-up (104)								
Median	−$235	64 (61.5)	$1,395	9 (8.7)	$863	10 (9.6)	$882	31 (30.0)
Mean ± SD	−$3,609 ± $13,665	—	$1,487 ± $1,419	—	$989 ± $1,023	—	−$1,883 ± $13,590	—
P[c]	.02	—	< .0001	—	< .0001	—	.11[d]	—
3rd follow-up (66)								
Median	−$378	39 (59.1)	$2,122	9 (13.9)	$1,199	5 (7.7)	$764	20 (30.8)
Mean ± SD	−$3,908 ± $14,963	—	$1,932 ± $1,865	—	$1,234 ± $1,176	—	−$1,622 ± $14,971	—
P[c]	.10[d]	—	< .0001	—	< .0001	—	.20[d]	—
4th follow-up (39)								
Median	−$367	22 (56.4)	$1,795	5 (13.2)	$1,195	5 (13.2)	$1,938	12 (31.6)
Mean ± SD	−$5,480 ± $16,519	—	$1,942 ± $1,777	—	$1,177 ± $1,196	—	−$2,808 ± $16,314	—
P[c]	.12[d]	—	< .0001	—	< .0001	—	.38[d]	—
5th follow-up (27)								
Median	−$329	15 (55.6)	$2,158	1 (4.0)	$1,066	2 (8.0)	$1,395	8 (30.8)
Mean ± SD	−$6,502 ± $17,244	—	$2,188 ± $1,431	—	$1,326 ± $1,918	—	−$3,356 ± $12,866	—
P[c]	.14[d]	—	< .0001	—	< .0001	—	.25[d]	—

PPPY = per patient per year; SD = standard deviation.

[a]Inclusion criteria: Each patient must have at least one pharmaceutical care services (PCS) visit before December 31, 2001 and a baseline cost and at least one follow-up cost. Cost data must be available for at least 6 months of the baseline year and 6 months of the follow-up year. Follow-up periods are defined as calendar years (January-December) with baseline year equaling the year immediately preceding the first PCS visit. If less than 12 months but at least 6 months of cost data were available, costs were annualized for that 12-month calendar year.

[b]Follow-up minus baseline: (negative number means costs decreased). All costs are adjusted to U.S. 2001 dollars. Insurance claims include physician office visits, hospitalizations, emergency department visits, and laboratory tests. The PCS visits are included in outpatient insurance claims for group 2 (Mission-St. Joseph's Health System). Prescription claims include prescriptions and supplies filled. The PCS visits are included in the prescription claims for group 1 (City of Asheville).

[c]Wilcoxon signed rank test for paired data (H0: baseline = follow-up). Unadjusted *P* values are shown. Using the Bonferroni adjustment for 5 tests, the significant *P* value would be .01 under the assumption that the critical value of *P* = .05 for only one test of significance.

[d]Power to detect a difference of 10% or more < .50.

IPERTENSIONE E DISLIPIDEMIA (JAPHA 2008)

- > 6 anni di osservazione (2000-2005)
- > 12 farmacie di comunità e ospedaliere
- > 18 farmacisti formati ad hoc
- > Policy
  - a) educazione alle pratiche per la riduzione del rischio cardio- e cerebro-vascolare (corso per i pazienti)
  - b) formazione ad hoc per i farmacisti
  - c) servizio di follow-up fornito dai farmacisti per visite di controllo pianificate, monitoraggio e collaborazione con i medici di base
- > Valutazioni degli esiti clinici ed economici su 500-600 pazienti

IPERTENSIONE E DISLIPIDEMIA (JAPHA 2008)

- > **outcomes clinici osservati**: modifiche nei valori della pressione sanguigna; colesterolo HDL/LDL/totale; trigliceridi; % pz che hanno raggiunto i valori obiettivo
- > **eventi vascolari osservati**: infarto miocardico, sindromi coronariche, attacchi ischemici, bypass coronarici, angioplastiche, altri disturbi vascolari
  - *per i quali si rilevano accessi al Pronto Soccorso ed episodi di ospedalizzazione, con i relativi costi diretti (facile in un sistema basato su assicurazioni private)*

IPERTENSIONE E DISLIPIDEMIA (JAPHA 2008)

- Outcomes clinici: la riduzione dei valori pressori

Table 2. Outcomes in patients with diagnosis of hypertension

Time period	No. patients at start of period/no. patients with available data[a]	SBP (mm Hg) Mean ± SD	DBP (mm Hg) Mean ± SD
Baseline	301	137.3 ± 16.85	82.6 ± 11.62
1 year	306/229	129.3 ± 14.80[b]	79.1 ± 9.20[c]
2 years	264/204	127.8 ± 15.05[b]	78.9 ± 10.01[b]
3 years	181/157	127.5 ± 12.57[b]	78.3 ± 8.33[b]
4 years	114/107	127.0 ± 13.93[b]	76.0 ± 8.98[b]
5 years	77/75	125.0 ± 13.00[b]	75.9 ± 8.11[b]
6 years	26/25	127.5 ± 11.60[b]	77.0 ± 8.37[b]
End of follow-up	375/278	126.3 ± 14.20[b]	77.8 ± 9.67[b]

Abbreviations used: DBP, diastolic blood pressure; HTN, hypertension; SBP, systolic blood pressure.

[a]Declining number of participants over time is a result of fewer patients being in the program for the full 6 years of the study, compared with those who were in the program for at least 1 year.

[b]Significantly different from baseline at $P < 0.0001$, Wilcoxon sign-rank test.

[c]Significantly different from baseline at $P < 0.0005$, Wilcoxon sign-rank test.

IPERTENSIONE E DISLIPIDEMIA (JAPHA 2008)

- Outcomes clinici: colesterolo e trigliceridi

Table 3. Outcomes in patients with diagnosis of dyslipidemia

	Mean ± SD (no. patients at start of period/no patients with available data)[a]			
Time period	**LDL (mg/dL) Mean ± SD (n)**	**TC (mg/dL) Mean ± SD (n)**	**TG (mg/dL) Mean ± SD (n)**	**HDL (mg/dL) Mean ± SD (n)**
Baseline	127.2 ± 36.60 (369)	211.4 ± 45.70 (341)	192.8 ± 171.41 (340)	48.0 ± 13.35 (374)
1 year	111.4 ± 32.99 (326/293)[b]	189.6 ± 38.72 (323/272)[b]	153.7 ± 79.85 (323/272)[b]	48.6 ± 13.03 (327/296)
2 years	107.0 ± 29.20 (273/236)[b]	186.2 ± 37.35 (267/214)[b]	161.8 ± 91.39 (266/213)[c]	48.1 ± 12.35 (278/242)
3 years	104.6 ± 27.74 (187/166)[b]	183.2 ± 35.52 (175/136)[b]	164.2 ± 114.23 (174/135)[d]	48.4 ± 13.67 (191)
4 years	105.1 ± 26.91 (112/99)[b]	181.6 ± 33.73 (110/83)[b]	162.6 ± 100.52 (110/83)[e]	48.3 ±14.75 (114/102)
5 years	111.0 ± 34.54 (68/63)[b]	187.3 ± 41.91 (68/55)[b]	144.4 ± 71.50 (68/55)[b]	47.4 ±12.34 (68/63)[f]
6 years	110.4 ± 32.15 (32/30)[g]	183.9 ± 38.88 (32/27)[b]	142.2 ± 65.43 (32/27)[h]	45.3 ± 11.26 (32/30)
End of follow-up	108.3 ± 32.06 (404/353)[b]	184.3 ± 38.55 (404/326)[b]	154.4 ± 88.35 (402/323)[b]	46.6 ± 12.24 (412/362)

Abbreviations used: HDL, high-density lipoprotein cholesterol; LDL, low-density lipoprotein cholesterol; TC, total cholesterol; TG, triglycerides.
[a]Declining number of participants over time is a result of fewer patients being in the program for the full 6 years of the study, compared with those who were in the program for at least 1 year.
[b]Significantly different from baseline at P <0.0001, Wilcoxon sign-rank test.
[c]Significantly different from baseline at P = 0.0002, Wilcoxon sign-rank test.
[d]Significantly different from baseline at P = 0.0077, Wilcoxon sign-rank test.
[e]Significantly different from baseline at P = 0.0005, Wilcoxon sign-rank test.
[f]Significantly different from baseline at P = 0.0388, Wilcoxon sign-rank test.
[g]Significantly different from baseline at P = 0.0029, Wilcoxon sign-rank test.
[h]Significantly different from baseline at P = 0.01, Wilcoxon sign-rank test.
[i]Significantly different from baseline at P = 0.0015, Wilcoxon sign-rank test.

IPERTENSIONE E DISLIPIDEMIA (JAPHA 2008)

- Outcomes clinici: eventi cardio- e cerebro-vascolari

Table 4. Changes in numbers of cardiovascular, cerebrovascular, and peripherovascular events during historical (n = 1,189 patient–years) and study (n = 1,286 patient–years) periods

CV event	Historical period No. events	Study period No. events	% Change (expected versus actual)[a]	Odds ratio (95% CI)
MIs	23	6	–86	0.24 (0.098–0.594)[b]
Non-MI ACS events	58	37	–40	0.60 (0.392–0.910)[b]
Other[c]	11	5	–59	0.41 (0.155–0.856)[b]
Total	92	48	–53	0.47 (0.328–0.671)

Abbreviations: ACS, acute coronary syndromes; CV, cardiovascular, cerebrovascular, and peripherovascular events; MI, myocardial infarction.

[a]Expected values were calculated by adjusting the actual number during the historical period for the increased number of records available during the study period.

[b]Significantly decreased at $P < 0.05$.

[c]Hypertensive crisis, acute heart failure, coronary artery bypass grafts, percutaneous transluminal coronary angioplasty, transient ischemic attack, and peripherovascular disease.

IPERTENSIONE E DISLIPIDEMIA (JAPHA 2008)

- Outcomes economici: costi diretti ➔ si osserva una riduzione del 46,5%, da 1362 $/anno (in media) a 734 $/anno.
- * La riduzione deriva da un aumento dei costi per farmaci che viene più che compensata dalla riduzione dei claim per i ricoveri

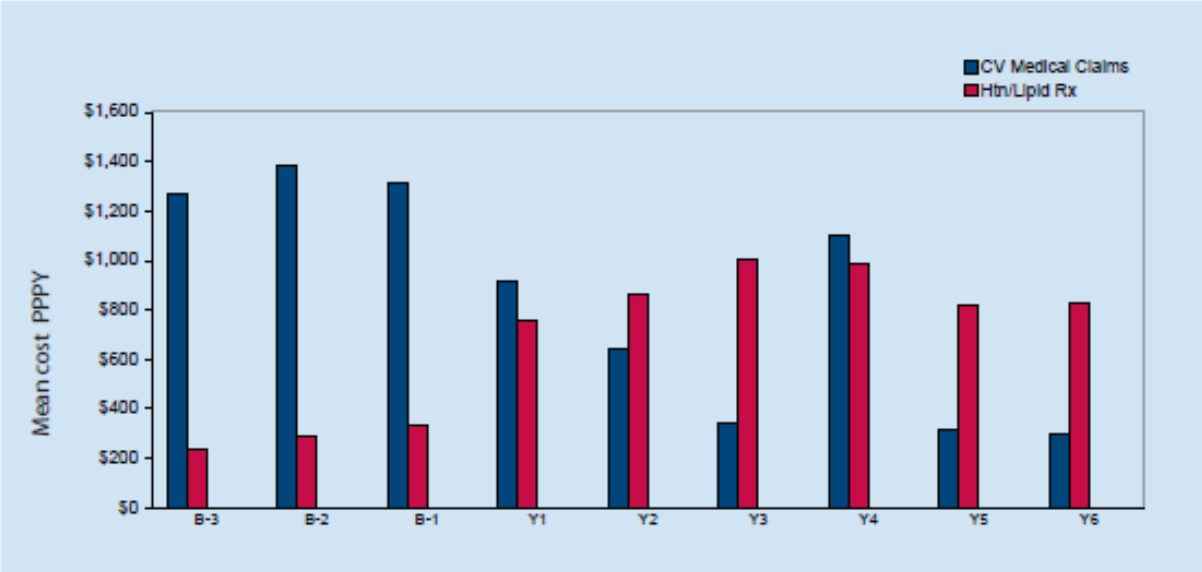


Figure 5. Annual mean direct medical costs for cardiovascular, cerebrovascular, and peripherovascular events during historical and study periods

Abbreviations: CV, cardiovascular, cerebrovascular, and peripherovascular events; HTN, hypertension; Rx, prescriptions; PPPY, per patient per year.

CHE COSA CI DOBBIAMO ASPETTARE PER IL PIEMONTE?

- Il pattern dei due studi riferiti al Progetto Asheville sembrano dare indicazioni chiare:
  - La spesa farmaceutica è destinata a crescere
  - La spesa per ricoveri e per l'accesso al pronto soccorso è destinata a ridursi
  - E' il rapporto di sostituzione fra le due a determinare il segno della variazione della spesa complessiva

QUALCHE NOTA DI CAUTELA …

- Mancanza di gruppi di controllo
- External validity?

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Review

Expanding the role of community pharmacists: Policymaking in the absence of policy-relevant evidence?

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