

Do individualized health promotional programs reduce health care expenditure?

A systematic review of controlled trials in the “Health-Up” model projects of the National Health Insurance

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Objectives The aim was to summarize the outcomes of the controlled trials in the “Health-Up” model projects of the National Health Insurance to quantify the effects of individualized health promotional programs (IHPPs) on outpatient and pharmaceutical health care expenditure.

Methods Reports submitted to the Ministry of Health, Labor & Welfare by municipalities participating in the projects were reviewed and monthly per-capita outpatient and pharmaceutical expenditures were extracted. Comparisons were made between the intervention and control groups as to temporal changes between one year before and the one year after the programs. Temporal changes were evaluated with reference to effect ratio with 95% CI.

Results A total of 31 programs conducted in 17 municipalities were included in the review. A total of 2,947 people participated in the IHPPs and 6,666 people were assigned to the control group in a randomized or matched manner. IHPPs varied widely as to the effects on health care expenditures: Sixteen programs demonstrated reduction effects ($ER < 1$), of which two were statistically significant, while fifteen programs demonstrated inflationary effects ($ER > 1$), of which two were significant. Overall, per capita health care expenditure of all participants increased by 4.7% (95%CI: 1.003–1.094) or 6,697 yen above the controls. The pooled ER was 1.044 (95% CI: 1.000–1.091) indicating a 4.4% inflation of the per capita health care expenditure of participants compared to the controls during the year after the interventions.

Conclusions Overall, IHPPs demonstrated slight but significant inflationary effects on outpatient and pharmaceutical health care expenditures. Follow-up studies must be conducted to adjudicate the long-term effects of IHPPs on health care expenditure.

Key words : economic evaluation, systematic review, National Health Insurance, insurance claims, health promotion

I. Introduction

Starting in April 2008, health insurers have been required to provide health checkups specifically designed to detect symptoms of the metabolic syndrome (collective terminology for diabetes, hypertension and hyperlipidemia) to beneficiaries aged 40–74 (approximately 58 million people) and offer health guidance to those who fulfill certain criteria. This “anti-metabolic syndrome” measure will be mandated as part of the health care reform 2008 including the health care expenditure containment projects at the prefectural level.

Compliance of health insurers will be monitored with benchmarks such as percentage of people receiving health checkups as well as percentage of people receiving appropriate health guidance to the “high risk”

groups. Financial penalties will also be imposed on insurers which fail to achieve the expected benchmarks after 2013¹⁾. The government hopes that the number of those suffering from the metabolic syndrome can be reduced by 25% in eight years between the baseline (2008) and the year 2015 with subsequent reduction of health care expenditure.

The “anti-metabolic syndrome” measures have precursors. In 2002, the so-called National Health Insurance (NHI) “Health-Up” model projects (hereafter the model projects) were set up in municipalities to develop effective individualized health promotional programs (IHPPs). The model projects were unique in that participating municipalities were required to conduct controlled trials to evaluate medical effectiveness as well as effects on health care expenditure by contracting experts to assure objective and scientifically sound evaluation.

A total of 33 municipalities were selected as trial sites, each for a period of three years starting from

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FY2002 in eight, FY2003 in 11 and FY2004 in 14 (the final year for the entire project was FY2006). Two manuals were developed based on the findings of the model projects: one was a manual for model projects [the model project manual]²⁾ and another was a manual for anti-metabolic syndrome guidance [the anti-metabolic manual]³⁾. Both manuals describe methodology for economic evaluation using health insurance claims but stop short of providing conclusive findings. The author here attempted to draw conclusions by conducting a systematic review of the reports submitted by participating municipalities from the viewpoint of insurers.

II. Methods

IHPPs which met the inclusion criteria described below following the definitions proposed by the two manuals as to the definition of cost and benefit (health care expenditure) were systematically reviewed.

1. Health care expenditure

According to the anti-metabolic manual (p.92), the effects of IHPPs on health care expenditure were evaluated in the following manner:

1) Effects on health care expenditure are an integral part of project evaluation and shall be conducted using health insurance claims in close collaboration with prefectural NHI federations.

2) Insurance claims account for only those who receive treatment at medical institutions; therefore the evaluation must include those who did not receive treatment by counting their health care expenditure as zero through matching the beneficiaries list.

3) Prefectural NHI federations regularly data-input diagnostic codes in claims submitted in May. If such disease-specific data are available, the temporal changes in metabolic-syndrome-specific, per-capita health care expenditure of the program participants should be evaluated over pre-, intra- and post- program periods.

4) One month data are subject to chance fluctuation as well as seasonal variation in health care expenditure. Ideally, it would be best to compare the individually aggregated annual health care expenditure over pre-, intra- and post- program periods. However, it is necessary to link claims of the same person in different months to obtain individually aggregated annual health care expenditure. If such individual aggregation is not feasible, it is also permissible to evaluate the temporal changes in the annual per-capita health care expenditure of the total program participants.

5) It is difficult to evaluate the effects of programs just by following up program participants. Therefore it is desirable to set up a control group sharing similar risks with the program participants and compare the two groups as to temporal changes over annual per-capita health care expenditure over pre-, intra- and post- program periods.

6) Control groups should be constructed by choosing two to three people from non-participants of similar sex and age group for every program participant.

2. Inclusion criteria

The author set up the following inclusion criteria for systematic review.

1) Health care expenditure did not include in-patient expenditure.

2) Controls selection by either randomization or matching (not self-selected by participants).

3. Evaluation of effects on health care expenditure

1) Disease-specific analysis was not performed because only a few municipalities provided disease-specific estimates of cost.

2) Annual per-capita health care expenditure was used for comparison. If the surveyed period was shorter than 12 months, annual expenditure was calculated by multiplying the monthly cost by 12.

3) Comparison was made between one year before and after the programs were conducted (the year in which the programs were implemented was not included).

4) Effects on health care expenditure of a program were measured by the *effect ratio*, *ER*, expressed as:

$$\text{Effect ratio} = \frac{P_{ia}/P_{ib}}{P_{ca}/P_{cb}}$$

where P denotes monthly per-capita cost; i, intervention group; c, control group; a, after the program and b, before the program.

$ER < 1$ means that the IHPP had reduced the health care expenditure while $ER > 1$ means that the IHPP inflated the expenditure compared to the controls. *ER* is an indicator to evaluate the health care expenditure containment effect of a program.

5) Annual health care expenditure reduction by IHPPs was calculated with the assumption that the health care expenditure of the participants (intervention group) would have increased at the rate of the control group had they not participated in the IHPP and could be obtained by subtracting the observed health care expenditure after the intervention from the hypothetical health care expenditure as:

Annual percapita health care expenditure reduction

$$= P_{ib} * \left(\frac{P_{ca}}{P_{cb}} - \frac{P_{ia}}{P_{ib}} \right) * 12$$

6) Pooled ER

Pooled ER was calculated by way of the Mantel-Haenszel estimator⁴⁾.

III. Data source

Data sources for this systematic review were project reports submitted to Ministry of Health, Labor & Welfare by participating municipalities by the end of September 2007. These reports are not academic publications and were not intended for disclosure. The author filed an application for disclosure to the head of the

Table 1 Effects on health care cost of individualized

Municipal name + program	Menu of IHPP	Target diseases ¹⁾	Age	N of observed month	BEFORE			
					intervention		control	
					Ni	monthly percapit a cost	Nc	monthly percapit a cost
NATASHO-SEIJIN-KYORYOKUKAINYU	diet	OB, HT, HC, DM	30-65	12	30	6,555.3	31	3,449.5
OBAMA-OBESITYI	exercise	HC	35-69	12	27	8,224.8	17	6,253.3
KANOYA-LIPID	exercise, diet	HC	35-64	12	68	10,126.2	49	9,009.9
YAHABA	exercise, diet	HT, HC, DM	20-	12	86	12,912.4	66	8,672.8
MISAKI-HATSURATSU	exercise, diet	DM, HC, HT, OB	50-75	12	37	10,615.2	38	6,037.5
NATASHO-KOREI- IKIGAISHIEN	gathering	OB, HT, HC, DM	60-75	12	53	8,232.7	50	9,546.6
SAJIKI-1kisei	lecture, weight measure	DM, HC, HT, OB	30-69	12	37	12,583.3	38	4,500.0
SANTO	walking	OB, HT, HC, DM	NA	12	115	6,083.3	115	4,975.0
NIHONMATSU-2002	exercise, diet	OB, HT, HC, DM	30-79	12	120	8,596.5	120	7,536.3
OKUIZUMO-heartful2005	exercise, diet	DM, OB, HT, HC	30-65	12	38	9,721.1	36	7,521.1
NIHONMATSU-2003	exercise, diet	OB, HT, HC, DM	30-79	3	96	8,956.7	96	8,397.4
TSURUOKA-CHIIKI	walking, lecture	OB, DM, HT, HC	40-69	6	78	10,677.0	186	12,673.0
OKUIZUMO-heartful2004	exercise, diet	DM, OB, HT, HC	30-65	12	66	6,854.8	57	5,617.8
FUJISAWA	group guidance	OB, HT, HC, DM	30-69	12	978	9,745.5	4,570	14,674.6
KANOYA-OSTEO	exercise, diet	OS	55-75	12	82	24,261.4	50	30,004.3
NICHINAN-FUREAI- MANABIPIA	lecture, group work	DM, HC, HT, OB	30-70	27	115	10,784.7	56	11,785.7
TSURUOKA-SHISETSU	lecture	OB, DM, HT, HC	40-69	6	21	12,744.0	10	9,656.0
SAJIKI-2kisei	lecture, weight measure	DM, HC, HT, OB	30-69	12	33	11,166.7	42	3,833.3
NATASHO-KOREI- KYORYOKUKAINYU	group work, diet	OB, HT, HC, DM	60-75	12	62	5,518.3	50	9,546.6
NATASHO-SEIJIN-ITKAINYU	Email	OB, HT, HC, DM	30-65	12	29	1,779.2	31	3,449.5
OBAMA-HYPERLIPIDEMIAII	exercise	HC	35-69	12	29	7,925.7	13	9,198.0
KAKEI-RONEN	muscle training	OB, HT, HC, DM, OS	66-79	12	91	18,021.7	57	38,323.3
MISAKI-FUREAIKIKI	lecture, group work	DM, HC, HT, OB	50-75	12	38	11,673.4	38	14,219.0
MITOYO	walking, diet	DM, HT, HC	40-69	1	250	13,314.0	250	14,927.0
UMI-2003	consultation	HT, DM	30-74	12	57	7,959.4	59	10,026.2
UMI-2004	consultation	HT, DM	30-74	12	44	90,341.0	41	73,931.0
TSURUOKA-JISHUKAT- SUDOSHIEN	group work	OB, DM, HT, HC	40-69	6	53	11,892.0	25	11,152.0
NAKAJO-GROUP2	exercise	HT, HC, DM	40-76	12	59	5,788.0	180	10,291.0
UEKI-Ikkisei	exercise, CTscan	MRFS	30-69	12	51	7,129.0	52	6,620.0
NAKAJO-GROUP1	lecture	HT, HC, DM	40-76	12	59	6,023.0	180	10,291.0
KAKEI-SONEN	exercise	OB, HT, HC, DM	40-65	12	45	4,493.4	63	9,995.3
TOTAL					2,947	11,371.6	6,666	13,884.9

¹⁾ HC: hyperlipidemia, HT: hypertension, DM: diabetes mellitus, OB: obesity, OS: osteoporosis, MRFS: multiple risk factor syndrome

²⁾ OP: outpatient, DRUG: pharmacy

³⁾ RCT: randomized controlled trial

NHI division of the Bureau of Health Insurance expressing the purpose, method and proposed publication [the application document is available upon request]. The application was approved on the condition that the evaluation committee members should be given an opportunity to review the results and make comments. The author reviewed all reports, extracted the health care expenditure data and tabulated the findings.

The following municipalities and a program had to be excluded from the systematic review for the reasons given.

1) Chino city (Nagano prefecture) 2002 intervention group

The city conducted two separate trials in 2002 and 2003, and used the sum of inpatient and outpatient costs for evaluation. However, five out 156 participants developed costly diseases (stomach cancer, cardiac bypass surgery, bone fracture, unknown malignancy and hyperthyroidism) and the report stated that the health care expenditure data of this intervention group would be inappropriate for evaluation.

health promotional programs (order by effect ratio)

N of observed month	AFTER		AFTER/BEFORE		effect ratio (ER)			pooled ER			Annual reduction of expenditure percapita	Health care cost included ²⁾	Method of assignment ³⁾
	intervention	control	intervention	control	95%CI		Mantel-Haenszel	95%CI					
					Low	High		Low	High				
12	3,039.3	5,037.6	0.464	1.460	0.317	0.192	0.524	0.317	0.192	0.524	78,407	OP+DRUG	RCT
12	7,556.2	10,159.9	0.919	1.625	0.565	0.308	1.037	0.475	0.323	0.697	69,683	OP+DRUG	Matching
12	8,970.0	11,451.3	0.886	1.271	0.697	0.483	1.006	0.632	0.484	0.823	46,800	OP	Matching
12	13,291.0	12,711.3	1.029	1.466	0.702	0.510	0.968	0.672	0.548	0.824	67,611	OP+DRUG	Matching
12	11,590.5	8,893.3	1.092	1.473	0.741	0.471	1.166	0.681	0.566	0.821	48,550	OP+DRUG	RCT
12	3,341.4	5,223.0	0.406	0.547	0.742	0.504	1.092	0.686	0.580	0.812	13,953	OP+DRUG	RCT
12	16,000.0	6,833.3	1.272	1.519	0.837	0.532	1.317	0.702	0.600	0.822	37,296	OP+DRUG	Matching
12	5,991.7	5,825.0	0.985	1.171	0.841	0.650	1.089	0.719	0.628	0.822	13,572	OP	Matching
12	9,366.8	9,362.2	1.090	1.242	0.877	0.681	1.130	0.753	0.669	0.848	15,750	OP	Matching
12	9,114.0	7,963.7	0.938	1.059	0.885	0.561	1.397	0.761	0.679	0.854	14,150	OP	RCT
3	9,301.9	9,372.1	1.039	1.116	0.931	0.701	1.235	0.786	0.707	0.874	8,331	OP	Matching
6	11,303.0	14,181.0	1.059	1.119	0.946	0.726	1.232	0.823	0.747	0.907	7,734	OP+DRUG	Matching
12	6,898.4	5,883.0	1.006	1.047	0.961	0.674	1.370	0.828	0.753	0.909	3,361	OP	RCT
12	9,336.4	14,553.5	0.958	0.992	0.966	0.902	1.035	0.932	0.884	0.983	3,945	OP+DRUG	Matching
12	22,504.8	28,804.8	0.928	0.960	0.966	0.680	1.373	0.936	0.889	0.986	9,441	OP	Matching
12	17,712.7	19,531.0	1.642	1.657	0.991	0.720	1.364	0.939	0.892	0.988	1,912	OP+DRUG	RCT
6	14,077.0	10,453.0	1.105	1.083	1.020	0.481	2.167	0.939	0.893	0.988	-3,373	OP+DRUG	Matching
12	12,583.3	4,166.7	1.127	1.087	1.037	0.657	1.636	0.940	0.893	0.988	-5,348	OP+DRUG	Matching
12	3,195.5	5,223.0	0.579	0.547	1.058	0.729	1.536	0.940	0.894	0.988	-2,117	OP+DRUG	RCT
12	2,761.9	5,037.6	1.552	1.460	1.063	0.641	1.764	0.940	0.895	0.988	-1,964	OP+DRUG	RCT
12	9,150.1	9,842.2	1.154	1.070	1.079	0.561	2.075	0.941	0.896	0.988	-8,032	OP+DRUG	Matching
12	22,021.4	43,200.2	1.222	1.127	1.084	0.778	1.509	0.959	0.914	1.007	-20,476	OP+DRUG	Matching
12	13,809.2	15,515.2	1.183	1.091	1.084	0.692	1.700	0.961	0.916	1.008	-12,860	OP+DRUG	RCT
1	18,727.0	19,023.0	1.407	1.274	1.104	0.926	1.315	0.979	0.935	1.026	-21,115	OP+DRUG	RCT
12	9,023.9	10,181.3	1.134	1.015	1.116	0.776	1.607	0.981	0.937	1.027	-11,296	OP	Matching
12	82,231.0	58,467.0	0.910	0.791	1.151	0.752	1.761	1.034	0.988	1.081	-129,437	OP	Matching
6	15,348.0	11,910.0	1.291	1.068	1.208	0.751	1.944	1.035	0.989	1.082	-31,772	OP+DRUG	Matching
12	9,764.0	14,316.0	1.687	1.391	1.213	0.904	1.627	1.036	0.991	1.084	-20,546	OP+DRUG	RCT
12	10,725.0	7,734.0	1.504	1.168	1.288	0.875	1.895	1.037	0.993	1.084	-28,756	OP+DRUG	Matching
12	11,489.0	14,291.0	1.908	1.389	1.374	1.024	1.843	1.041	0.996	1.087	-37,499	OP+DRUG	RCT
12	11,291.1	13,330.3	2.513	1.334	1.884	1.285	2.762	1.044	1.000	1.091	-63,580	OP+DRUG	Matching
	12,340.9	14,386.9	1.085	1.036	1.047	1.003	1.094	1.044	1.000	1.091	-6,697		

2) Izumisano city (Osaka prefecture)

The report states that “Claims for two years before and after the program were surveyed including secondary diagnoses in inpatient and outpatient. No significant difference has been detected between the intervention and control groups after excluding an inpatient case of pancreatic cancer in the control group”. However, no quantitative analysis on health care expenditure was described in the report and the attached CDROM did not include data after the program (the report states that the attached CDROM includes the claims data up to Dec 2005, but the CDROM actually

contained data up to July 2004).

3) Inami town (Hyogo prefecture)

No report was submitted.

4) Kashiba city (Nara prefecture)

The program did not set up a control group.

5) Usuki town (Oita prefecture)

Analysis of insurance claims was not conducted and individual health care expenditure was estimated by interviews.

6) Owani town (Aomori prefecture), Komatsu city (Ishikawa prefecture), Sapporo city (Hok-

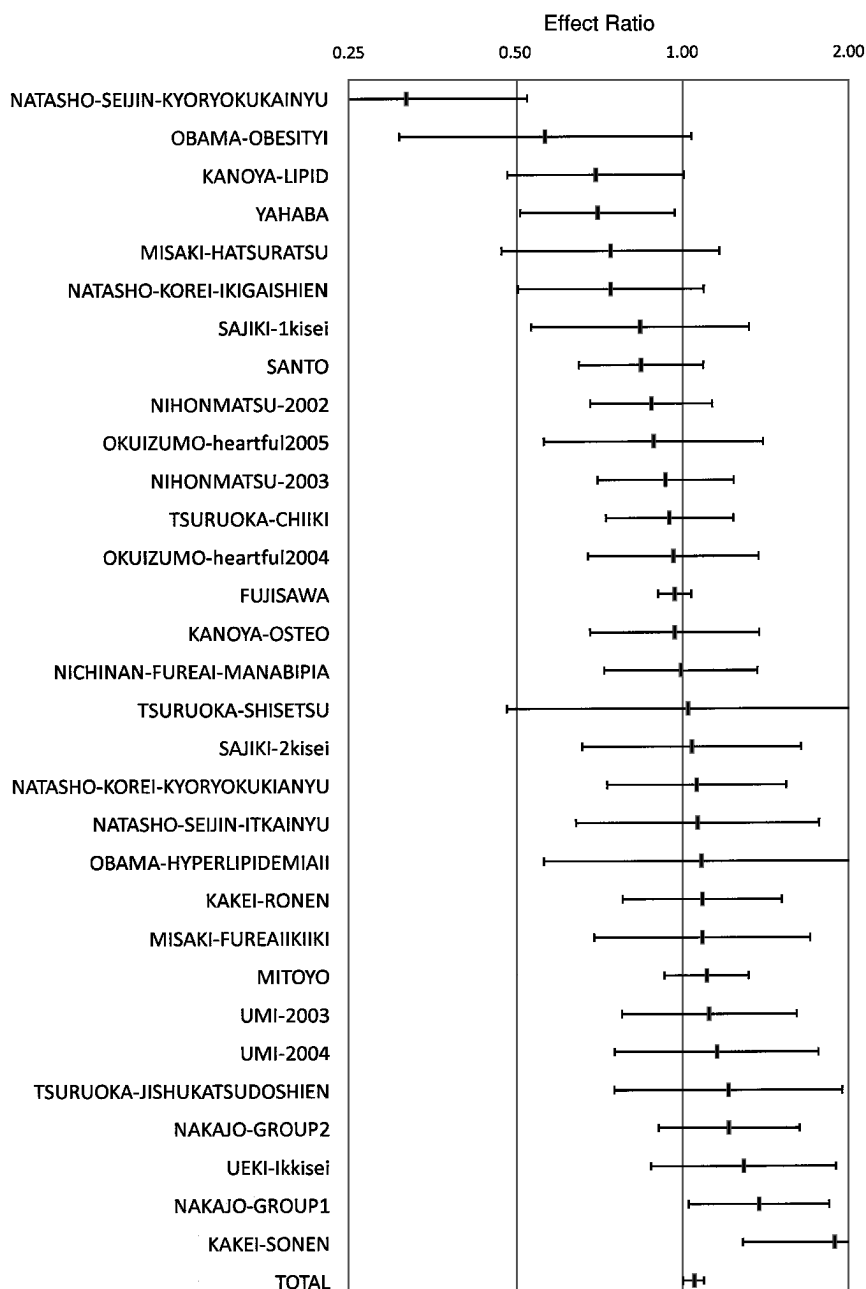


Fig. 1 Effect Ratios of Individualized Health Promotional Programs on health care expenditure

kaido), Wakuya town (Miyagi prefecture), Fuji-Yamato town (Saga prefecture), Yokkaichi city (Mie prefecture)

Health care expenditure included inpatient expenditure.

7) Sakashita town (Gifu prefecture), Kyowa town (Ibaraki prefecture), Souka city (Saitama prefecture)

Assignment to intervention and control groups was self-selected.

8) Haibara town (Kochi prefecture)

Health care expenditure included inpatient expenditure and assignment was self-selected.

9) Higashi-Kurume city (Tokyo prefecture)

The report states that “although claims analysis was conducted between the intervention and control groups, no significant difference has been detected” but no data were contained.

IV. Results

A total of 31 programs conducted in 17 municipalities were included in the review. A total of 2,947 people participated in the IHPPs and 6,666 people were assigned to the control group in a randomized or matched manner. The results are summarized in [Table 1], which lists the 31 IHPPs in the order of ER. IHPPs varied widely as to the effects on health care expenditure: Sixteen programs demonstrated reduction effects (ER

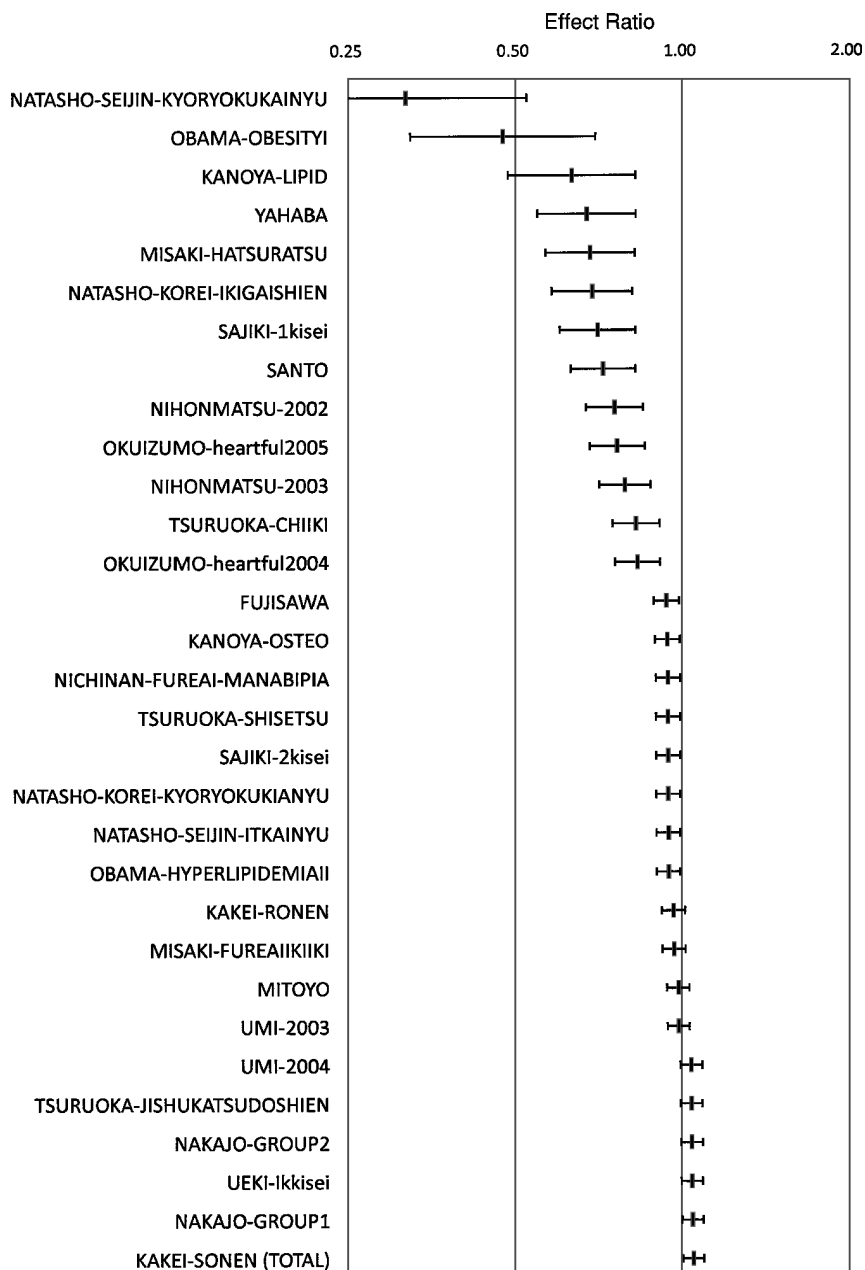


Fig. 2 Pooled Effect Ratio of Individualized Health Promotional Programs on health care expenditures by Mantel-Haenszel estimator

< 1), but only two were statistically significant, while fifteen programs demonstrated inflationary effects (ER > 1), of which two were significant [Fig. 1]. Per-capita health care expenditure of all participants increased by 4.7% (95%CI: 1.003-1.094) or 6,697 yen above the controls. Monthly per-capita health care expenditure of the intervention vs. control groups were 11,371.6 yen vs. 13,884.9 yen before the intervention and 12,340.9 yen vs. 14,387 yen after the intervention, or 1.085 fold vs. 1.036 fold increases, respectively.

[Fig. 1] shows ERs with 95% confidence intervals. Although, values varied widely, some programs demonstrated statistically significant inflationary or containment effects on health care expenditure. Only

two programs, namely NATASHO-SEIJIN-KYORYOKUKAINYU and YAHABA programs demonstrated the upper 95%CI limit of their ERs below one, indicating significant health care expenditure reduction, while two programs, namely NAKAJO-GROUP1 and KAKEI-SONEN programs demonstrated significant inflationary effects on health care expenditure.

Pooled ER generated with the Mantel-Haenszel estimator was 1.044 (95%CI: 1.000-0.971) indicating 4.4% inflation of the percapita health care expenditure of participants compared to the controls during the one year after the programs were conducted [Fig. 2].

V. Discussion

Containment effects of preventive medical activities on health care expenditure have been suggested by retrospective, ecological studies using administrative data of municipal governments⁵⁾. However, such evidence needs to be strengthened by controlled trials and, ideally, systematic review of multiple trials. The NHI health-up model projects started in 2002 offer a rare occasion in which economic impacts of different interventions can be evaluated using a national uniform fee schedule thanks to Japan's national health insurance system.

A total of 33 municipalities participated in the projects and outcomes have already been reported by each evaluation experts for Fujisawa city⁶⁾, Kyowa town⁷⁾, Komatsu city⁸⁾ and Umi town⁹⁾. Also, economic effects have been reported separately for Yahaba town¹⁰⁾ and Nihonmatsu city¹¹⁾. Such isolated reporting is attributable to the fact that each municipal government assigned an expert for evaluation who was responsible for data analysis and reporting to the government. The experts organized a central committee but it dissolved as soon as the project term ended in FY 2006 and no systematic review has hitherto been conducted. The author, aware of the importance of extracting firm evidence by way of systematic review since the projects started in 2002, volunteered to conduct the present reviews incorporating comments from the former committee members through "public comments" with a letter soliciting comments [available from the author upon request] from the NHI division of MHLW on 5th October 2007 with the deadline on 9th November.

The systematic review of the model projects did demonstrate mild inflationary effects on health care expenditure in the first year after the program was implemented. It also revealed considerable variance in the effects of IHPPs on health care expenditure. Contrary to popular belief that health promotional programs improve health status and thereby reduce health care expenditure, about half of 31 IHPPs showed inflationary effects on health care expenditure one year after the interventions. This sends a strong caution to health insurers that they should never presume any IHPPs will bring in savings. IHPPs are double-edged swords: they could bring in a considerable saving or a considerable inflation in health care expenditure. Health insurers should therefore constantly monitor the effects of IHPPs on health care expenditure to ensure that they are achieving the expected savings, particularly when they outsource the program administration to outside organizations.

Overall, IHPPs demonstrated mild inflationary effects on outpatient and pharmaceutical expenditure in one year after intervention (4.7% increase of per-capita expenditure compared to the control group),

although many of them failed to achieve statistical significance due to sample size. This fact emphasizes the importance of the responsibility of health insurers in choosing IHPPs with good containment effects on health care expenditure, otherwise insurers may face undue inflation of health care expenditure.

The findings of the present review appear consistent with those of Kamiyama et al¹²⁾, who conducted similar controlled trials to measure economic analyses of exercise classes in four municipalities (numbers of intervention groups): M city in Niigata (N=63); S city in Toyama (N=62); K city in Saitama (N=54); and W town in Ehime prefecture (N=8). A lower-than-control-group increase of cumulative outpatient costs was observed in the intervention groups but statistical significance failed to be reached except for W town. He further attempted the same trial on dietary guidance in another town in Mie prefecture but again failed to reveal any significant difference in the cumulative outpatient cost between the intervention and control groups¹³⁾. Both findings suggest that the cost-benefit of health promotional activities are modest at best and cannot be relied upon as effective containment measures of health care expenditure.

The author acknowledges that the present review suffers from some limitations. The first concerns the time frame: the findings of this systematic review only apply to comparison of one year periods before and after the interventions. The long-term effects of IHPPs on health care expenditure remains unclear and determination of whether the observed inflationary effects are long-lasting or short-lived will necessitate a long-term follow-up, like the one involving the Government-managed health insurance claims¹⁴⁾. Second limitation is the lack of any disease-specific analysis. This was because none of the participating municipalities except Komatsu and Umi¹⁵⁾ conducted disease-specific analyses of health care expenditure. Since each IHPP targets lifestyle-related diseases, it would be natural to assume that such interventions affected only the targeted diseases. Comparison by all-disease cost would naturally dilute the containment effects of IHPPs on health care expenditure due to specific diseases.

VI. Conclusions and policy recommendations

The Health Care Expenditure Containment Plan as part of the Health Care Structural Reform 2008 was originally proposed to reduce the national health care expenditure by two trillion yen from the anticipated 40 trillion yen in 2015 (approximately 5% reduction) through combined effects of measures against the metabolic syndrome and reduction of length of hospital stay¹⁶⁾. However, the ministerial policy for The Health Care Expenditure Containment Plan published in March 2008 officially acknowledged that reduction of health care expenditure in the first five-year plan could

not be expected¹⁷⁾. Evidence obtained from the model projects that IHPPs will not necessarily reduce health care expenditure at least in the first year after intervention might have contributed to the policy change. Therefore, health insurers must be carefully choose IHPPs with a favorable cost-benefit performance.

To ensure that anti-metabolic syndrome measures are successful, the following recommendations must be observed.

1) A data system for evaluating the cost-effectiveness of providers of specific health guidance should be established. Such a system should be able to link claims data and health checkups and guidance data on a personal level.

2) One shall not be too optimistic about health care expenditure control through prevention. Policy makers should consider improved disease management programs, rather than prevention, as effective health care expenditure containment measures.

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