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Estimation of Drug Cost Reductions by Introducing formularies for An Employment-based Health Insurance Plan : A Simulation Using " Wellness-Star☆ " Health Insurance Claims Database

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OBJECTIVES

- A formulary is a standardized list of prescription drugs that are evaluated based on efficacy, safety, quality, dosage form, usability, and cost-effectiveness.
- The introduction of formularies at the regional level or by insurers is attracting attention as a means of achieving three goals: improving the quality of healthcare through standardization, reducing drug costs, and ensuring a stable supply of drugs.
- The use of formularies in Japan is still limited compared to Western countries. The main reason for this is that, in Japan, the scope of drug benefits is uniformly determined under universal health insurance.
- The Japan Formulary Society (JFS), established in 2021, is a General Incorporated Association that promotes the research, dissemination, and implementation of formularies in the healthcare system. They have already established and published a formulary for 30 drug groups, mainly for the treatment of lifestyle-related diseases, for their members. Table 1 shows the formulary for oral acid secretion inhibitors (PPI, P-CAB)
- This study focuses on reducing drug costs. The objective of this study is to estimate the reduction of drug costs by introducing the 30 formularies by JFS.

Recommended Drug	Alternatives
Generic Esomeprazole 10mg, 20mg Generic Rabeprazole 5mg, 10mg, 20mg Generic Lansoprazole 15mg, 30mg	Brand Esomeprazole 10mg, 20mg Vonoprazan 10mg, 20mg

Table1: Formulary for oral acid secretion inhibitors (PPI, P-CAB) by JFS

Recommended drugs are those that are positioned as the most standard drugs in a given drug class. They are recommended as regional formulary drugs because they have been examined based on evidence and are superior in terms of efficacy, safety and cost-effectiveness. Note that the recommended drugs are generics (or biosimilars), and not the brand drugs.

Alternative drugs are those can be used in certain specific situations. They are defined as alternatives for both brand and generic drugs, but they are not recommended drugs in regional formulary.

PPI: Proton-pump inhibitor, P-CAB: Potassium-Competitive Acid Blockers, JFS: Japan Formulary Society

METHODS

- "Wellness-Star☆", a database owned by Nippon Life and consisting of claims from health insurance societies, include 4.9 million insureds, which is 18% of the those of the health insurance societies.
- Using the database, we conducted a simulation to estimate the reduction of drug costs if the formularies developed by JFS were to be applied as a standardized employment-based health insurance plans.
- The amount of cost reduction was estimated as the sum of the differences between actual and hypothetical costs for all claims that included not-recommended drugs in the 30 formularies. The hypothetical cost was calculated as the number of days prescribed multiplied by the average cost per day of the recommended drugs in the same formulary.

RESULTS

- The database consisted of health insurance claims for 4,881,403 insureds from April 2014 to March 2023. The medical cost Per Member Per Year(PMPY) was 129,469 JPY, the drug cost PMPY was 30,390 JPY (23.5% of the medical cost), the drug cost PMPY for drugs covered by the formulary was 5,366 JPY(4.1%). Thus, the drug cost reduction achieved PMPY was 2,318 JPY (1.79%).

Gender	Age	Num Insureds	Medical Cost	Drug Cost	Drug Cost Within Formularies	Simulated Drug Cost within Formularies	Cost Reduction	Cost Reduction in Medical Cost
男 male	0-9	648	¥160,374	¥32,995	¥ 1,826	¥1,101	¥ 725	0.45%
	10-19	706	¥ 79,973	¥21,009	¥ 2,504	¥1,321	¥1,183	1.48%
	20-29	800	¥ 52,993	¥13,273	¥ 2,698	¥1,188	¥1,510	2.85%
	30-39	845	¥ 68,981	¥18,690	¥ 3,867	¥1,820	¥2,047	2.97%
	40-49	1,041	¥109,584	¥28,683	¥ 6,067	¥3,278	¥2,789	2.55%
	50-59	847	¥197,130	¥47,196	¥10,701	¥6,435	¥4,266	2.16%
	60-69	418	¥321,048	¥69,166	¥15,484	¥9,752	¥5,732	1.79%
女 female	0-9	615	¥137,816	¥28,259	¥ 1,621	¥ 945	¥ 677	0.49%
	10-19	656	¥ 68,746	¥16,968	¥ 2,230	¥1,158	¥1,072	1.56%
	20-29	603	¥ 81,394	¥17,886	¥ 2,578	¥1,331	¥1,247	1.53%
	30-39	738	¥112,567	¥23,737	¥ 3,579	¥1,942	¥1,637	1.45%
	40-49	985	¥123,908	¥30,251	¥ 5,169	¥2,936	¥2,233	1.80%
	50-59	767	¥182,964	¥44,378	¥ 9,033	¥5,295	¥3,738	2.04%
	60-69	329	¥284,259	¥66,177	¥14,375	¥8,690	¥5,685	2.00%
Total		**10,000**	**¥129,469**	**¥30,390**	**¥5,366**	**¥3,048**	**¥2,318**	**1.79%**

Table 2: Reduction of Simulated Medical Cost by Demographics

Drug Cost within Formularies: Cost of drugs covered by JFS formulary

Simulated Drug Cost within Formularies: Drug costs if the all drugs covered by JFS Formularies were replaced with recommended drugs hypothetically

PMPY: Per Member Per Year JFS: Japan Formulary Society

Formularies	Days Supplied (Million) a+b	(a) Recommended	(b) Not Recommended	b/(a+b)	Cost Per Day (JPY) (a) Recommended	(b) Not Recommended	b/a
Second-generation antihistamines	363	116	247	68%	¥27.9	¥40.9	1.47
Statins	254	65	189	74%	¥13.3	¥19.1	1.44
DHP-type calcium channel blockers	230	160	70	30%	¥11.7	¥18.6	1.58
ARB	202	50	152	75%	¥16.0	¥40.7	2.54
Anti-inflammatory and painkillers (oral)	150	39	111	74%	¥28.4	¥60.3	2.12
PPI/P-CAB	124	48	76	61%	¥20.3	¥70.2	3.47
Drugs that inhibit the production of uric acid	114	33	81	71%	¥11.5	¥26.1	2.28
Drugs for neuropathic pain	95	3	92	97%	¥36.3	¥89.1	2.46
ARB/DHP-type calcium channel blockers	81	23	58	72%	¥23.0	¥44.7	1.95
Drugs for chronic constipation	74	39	35	47%	¥18.1	¥56.1	3.10

Table3: Top 10 Formularies Having Largest Days Supplied with Cost Per Day by Recommendation

PPI: Proton-pump inhibitor, P-CAB: Potassium-Competitive Acid Blockers, DHP: Dihydropyridine

CONCLUSIONS

- The potential reduction in medical cost for a standardized health insurance society by introducing the formularies was **1.79%** of total medical cost.
- The percentage of medical cost reductions is larger for men in their 20s and 30s.
- As those insureds by employment-based health insurance plans are younger than the population, the reduction would be greater if expanded to all the population.