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Does the Elderly's Number of Prescribed Medications across Months Matter? National Cohort versus Single-Center Cohort

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ABSTRACT

Objectives: To investigate the monthly number of prescribed medication (NPM) patterns among different elderly populations and the factors associated with monthly NPM changes. **Methods:** This retrospective cohort study was conducted using the databases obtained from National Health Insurance Research Databases and a 2000-bed academic medical center in Taiwan (i.e., single-center cohort). We compared the monthly NPMs, demographic characteristics, disease states, and health care contacts among the National Health Insurance elderly cohorts in 2006 and 2007, and for those elderly in the national and single-center cohorts who had outpatient visits from November to October in 2006 to 2007 and 2007 to 2008, respectively. Generalized estimating equation analyses of repeated measures were performed for monthly NPMs. **Results:** The average monthly NPMs among the National Health Insurance elderly cohort was 2.33 in 2006 and 4.39 in 2007, respectively. After controlling for other factors, the increment in the proportion of monthly NPMs among the older elderly patients, in certain months and for those patients with hypertension and dyslipidemia, was statistically significant among the single-center cohort but was not observed in the national elderly cohort. The proportional changes decreased significantly among patients who made visits to emergency rooms and who were hospitalized during a 1-year period. **Conclusions:** There was an incremental trend of monthly NPMs among the national cohort from 2006 to 2007. Although acute exacerbations and hospitalization might be the protecting factors of increasing monthly NPMs, more attention should be paid toward high-utilization patients with specific diseases during certain months for different elderly cohorts.

Keywords: elderly, monthly, number of prescribed medications.

Introduction

Managing medication for frail elderly patients is a huge challenge because they are very likely to be given medications inappropriately, including encountering the problem of polypharmacy [1,2]. Although polypharmacy is a common problem among the elderly who have more chronic diseases and more contacts with different prescribers [3–6], it is unclear whether the polypharmacy occurred on individual elderly *per se* over times.

The World Health Organization/International Network of Rational Use of Drugs (WHO/INRUD) recommends using the "average number of medicines prescribed per patient encounter" as "prescribing indicators" to evaluate problems of medication use for antibiotics [7]. Schneeweiss et al. [8] recommend using the number of distinct medications received on an individual patient within 1 year to explore the extent of medication use patterns and the impact on future physician office visits, medical expenditure, and patients' mortality. Although older patients with chronic conditions are very likely to be added on or withdrawn from any specific drug and/or drug classes across times [9], it is expected that the NPMs received by the individual elderly might be changed dynamically or remain the same whenever the condition is stable.

To help health care policy decision makers in formulating appropriate strategies to mitigate problems with a system that involves elderly patients using various prescribers and visiting multiple hospital settings, the objectives of this study were to compare the monthly number of prescribed medication (NPM) patterns received from outpatient visits among the different

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Table 1 – Effect of change in NPMs by proposed factors.

Parameter	National elderly cohort						Single-center elderly cohort					
	Est.	SE	95% CI		Z	Pr > |Z|	Est.	SE	95% CI		Z	Pr > |Z|
Intercept	1.4661	0.0097	1.447	1.4852	150.5	<0.0001	1.055	0.0193	1.0171	1.0929	54.54	<0.0001
Demographic characteristic												
Sex: female	0.0268	0.0042	0.0186	0.035	6.43	<0.0001	0.0102	0.0093	−0.008	0.0284	1.1	0.2726
Age 70–74 y	0.0121	0.0056	0.0012	0.0231	2.17	0.0303	0.0459	0.0129	0.0206	0.0712	3.56	0.0004
Age 75–79 y	0.0054	0.0062	−0.0067	0.0174	0.87	0.3832	0.0794	0.0132	0.0535	0.1053	6	<0.0001
Age 80–85 y	0.005	0.0064	−0.0076	0.0175	0.77	0.4384	0.0694	0.0153	0.0395	0.0993	4.55	<0.0001
Age ≥85 y	−0.0067	0.0076	−0.0215	0.0081	−0.89	0.3740	0.0740	0.0185	0.0377	0.1103	3.99	<0.0001
Disease status												
No. of *ICD* > 6	−0.1143	0.0091	−0.1322	−0.0963	−12.50	<0.0001	0.2125	0.0093	0.1942	0.2308	22.75	<0.0001
With DM	0.1642	0.005	0.1544	0.1741	32.64	<0.0001	0.1893	0.0101	0.1694	0.2092	18.65	<0.0001
With HTN	0.0028	0.0046	−0.0062	0.0119	0.62	0.5371	0.1612	0.01	0.1416	0.1808	16.08	<0.0001
With LIP	0.0055	0.0052	−0.0046	0.0157	1.07	0.2825	0.0716	0.0106	0.0509	0.0924	6.76	<0.0001
With CVD	0.1155	0.0066	0.1026	0.1285	17.52	<0.0001	0.1547	0.0109	0.1333	0.1761	14.17	<0.0001
With IHD	0.0495	0.0049	0.0399	0.0592	10.02	<0.0001	0.2272	0.0106	0.2064	0.248	21.42	<0.0001
With HEPA	−0.0142	0.0081	−0.0301	0.0018	−1.74	0.0818	0.0041	0.0185	−0.0323	0.0404	0.22	0.8268
With CKD	0.5552	0.0225	0.511	0.5993	24.62	<0.0001	0.285	0.017	0.2517	0.3182	16.79	<0.0001
With LUNG	0.0632	0.0049	0.0536	0.0728	12.89	<0.0001	0.2205	0.0128	0.1954	0.2456	17.22	<0.0001
With CANCER	0.0405	0.0085	0.0238	0.0572	4.74	<0.0001	0.0447	0.0167	0.012	0.0773	2.68	0.0074
Health care contact												
No. of OPD visits > 8	0.1416	0.0090	0.1239	0.1592	15.73	<0.0001	1.0579	0.0164	1.0257	1.0901	64.37	<0.0001
Ever admit ER	−0.0803	0.0059	−0.0919	−0.0687	−13.6	<0.0001	−0.0339	0.0139	−0.0612	−0.0066	−2.43	0.015
Ever hospitalization	−0.0295	0.0055	−0.0403	−0.0186	−5.33	<0.0001	−0.0741	0.0131	−0.0998	−0.0485	−5.66	<0.0001
Month (2006–2007 for national elderly cohort and 2007–2008 for MC elderly cohort)												
November	−0.6621	0.004	−0.6699	−0.6542	−165.17	<0.0001	0.146	0.0067	0.1328	0.1591	21.77	<0.0001
December	−0.648	0.0041	−0.6561	−0.6399	−156.73	<0.0001	0.1312	0.0065	0.1184	0.144	20.08	<0.0001
January	0.0121	0.004	0.0042	0.02	3	0.0027	0.1435	0.0063	0.1312	0.1558	22.92	<0.0001
February	0.004	0.0039	−0.0037	0.0117	1.01	0.3137	0.0422	0.0064	0.0296	0.0548	6.56	<0.0001
March	0.0119	0.004	0.0041	0.0198	2.97	0.003	0.0914	0.006	0.0796	0.1031	15.23	<0.0001
April	−0.0008	0.0039	−0.0085	0.0069	−0.2	0.8414	0.0745	0.0057	0.0634	0.0856	13.16	<0.0001
May	−0.0069	0.0039	−0.0145	0.0006	−1.79	0.0731	0.0493	0.0054	0.0388	0.0598	9.2	<0.0001
June	−0.009	0.0039	−0.0167	−0.0012	−2.28	0.0229	0.0343	0.0052	0.024	0.0445	6.54	<0.0001
July	−0.0078	0.0038	−0.0154	−0.0003	−2.04	0.0411	0.0282	0.0048	0.0188	0.0377	5.86	<0.0001
September	0.0039	0.0038	−0.0035	0.0113	1.04	0.3	−0.0033	0.0049	−0.0129	0.0063	−0.68	0.4985
October	−0.1042	0.0041	−0.1122	−0.0962	−25.44	<0.0001	0.0305	0.0053	0.0201	0.0409	5.75	<0.0001

Note. The reference month is August. Reference subjects: those who had no DM, no HTN, no LIP, no CVD, no IHD, no HEPA, no CKD, no OPD, with no hospitalization experience, with no ER experience, were men, aged 65–70 y.

CANCER, top 10 cancers; CI, confidence interval; CKD, chronic kidney disease; CVD, cerebrovascular disease; DM, diabetes mellitus; ER, emergency room; Est., estimation; HEPA, chronic hepatitis; HTN, hypertension; *ICD*, *International Classification of Diseases*; IHD, ischemia heart disease; LIP, hyperlipidemia; LUNG, respiratory diseases; MC, Medical Center; NPM, number of prescribed medications; OPD, outpatient department; SE standard error.