

以ATC分類探討全民健康保險 藥品之利用與分配



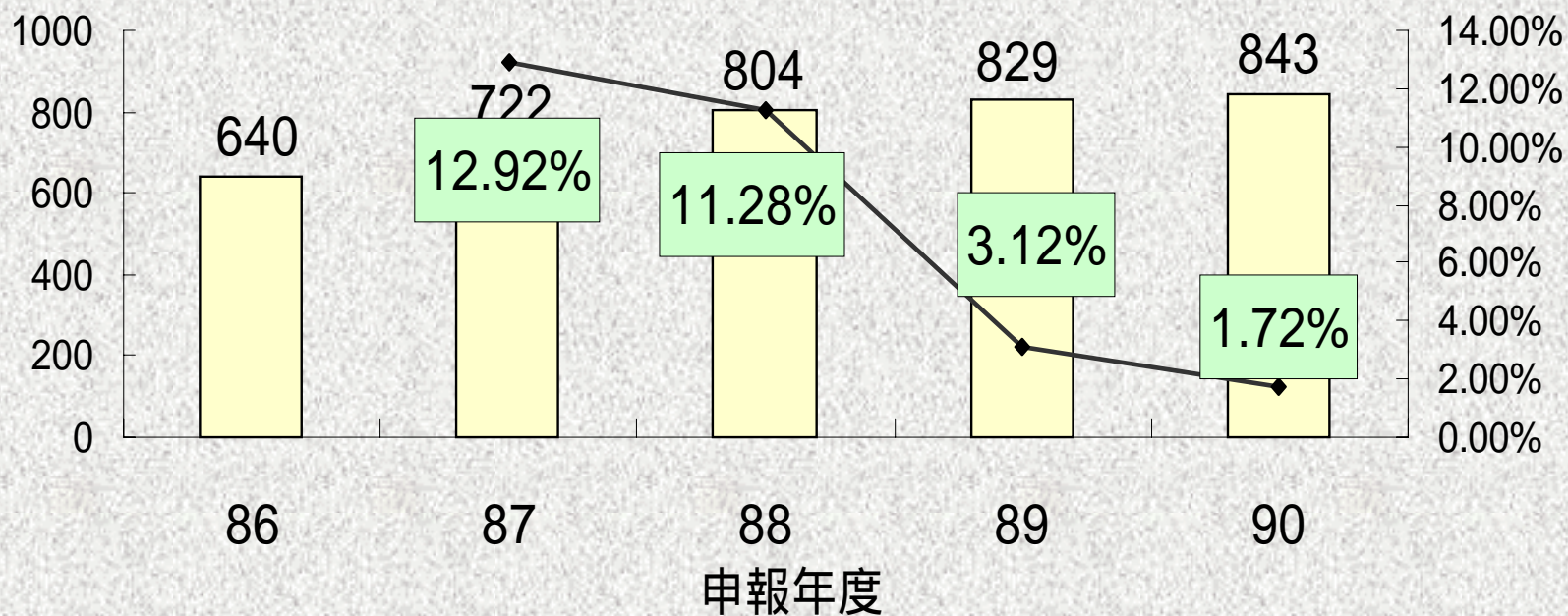
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全民健保藥費趨勢

億元

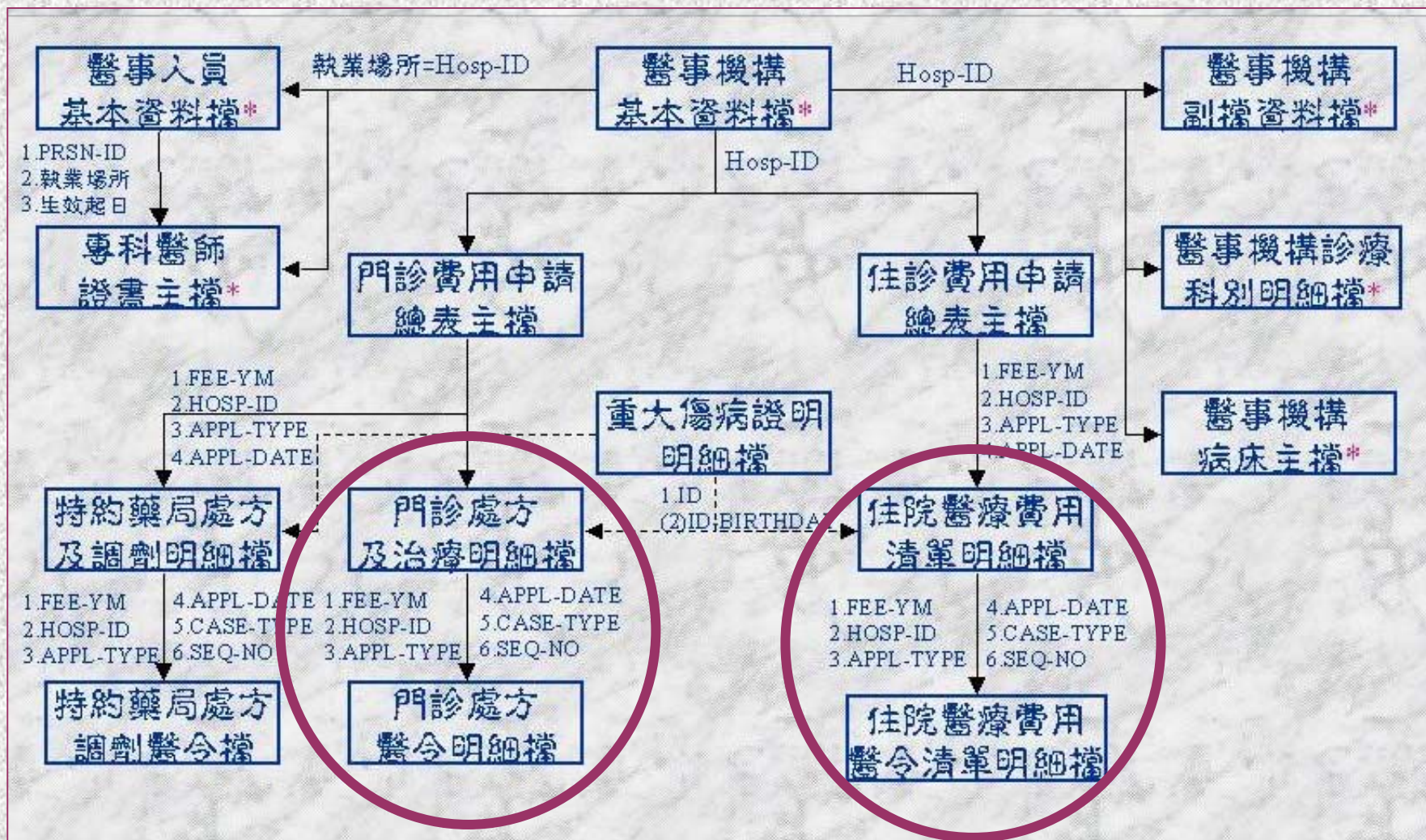
成長率



藥費申報金額

藥費成長率

全民健康保險學術研究資料庫





全民健康保險學術研究資料庫

- 處方及治療明細檔 (CD & DD)
 - Date/Sequence number
 - Patient ID
 - Setting/Specialty/Type of medical services
 - Diagnosis/Surgical operation
 - Dispensing status
 - Physician/Pharmacist ID
 - Medical expenditures to claim: drug cost, medical services, consultation fee, pharmacy service fee, etc.



醫療支付的分配

以八十九年為例

- 診察費 + 手術費 = 655億元/年
- 藥事服務費 = 80億元/年
- $655\text{億元}/27876\text{人} = 235\text{萬元/人/年}$
- $80\text{億元}/17638\text{人} = 45\text{萬元/人/年}$
 - 社區藥局 – 4.2億元/6500人
 - 醫療機構 – 75.5億元/11000人



全民健康保險學術研究資料庫

What drug?

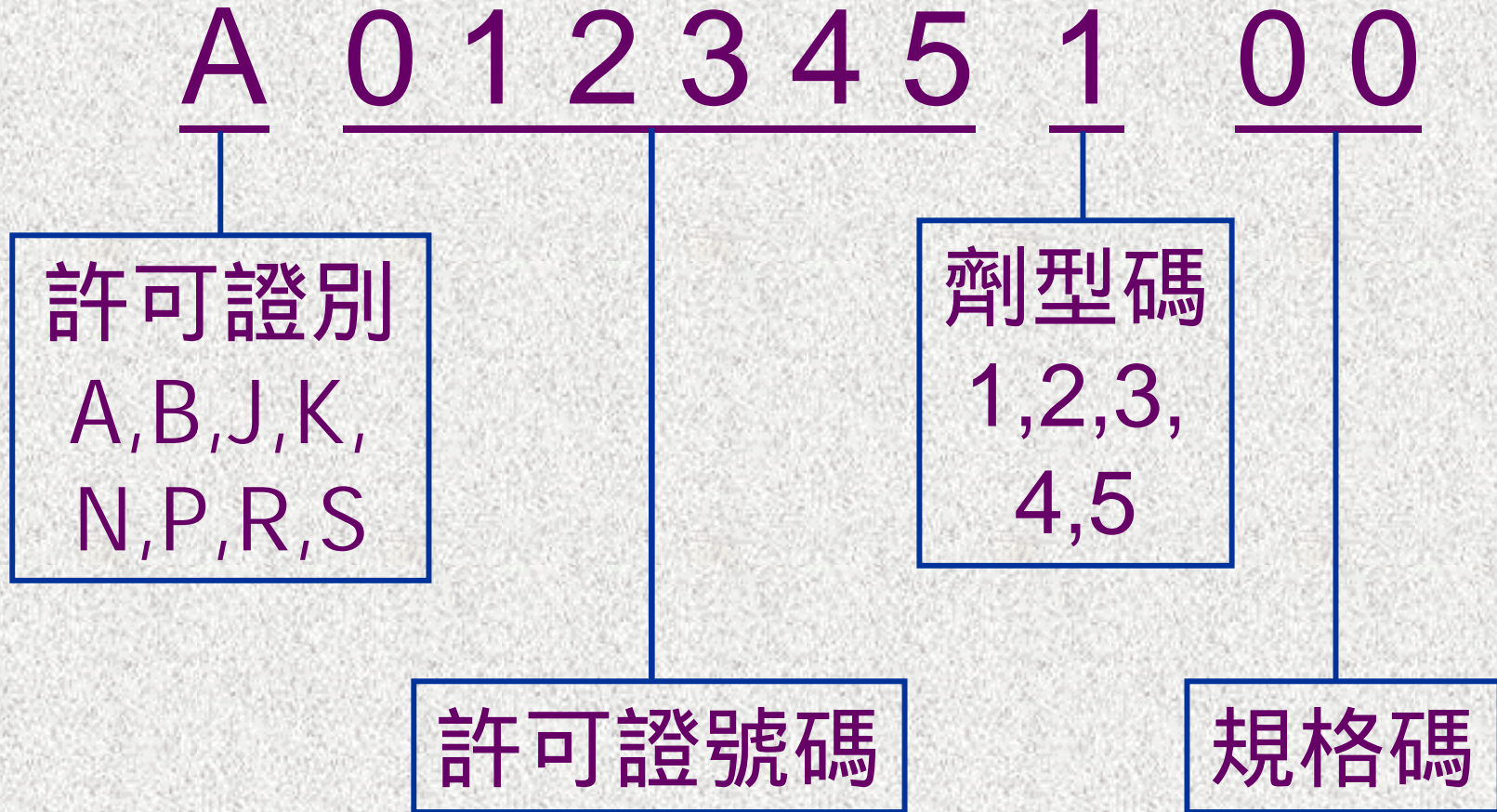
How used?

What cost?

■ 處方醫令明細檔 (OO & DO)

- 識別碼
- 醫令類別
- 藥品代號 – 健保藥品代碼
- 藥品用量 – 藥品一次之劑量
- 藥品使用頻率
- 單價
- 總量
- 金額

健保藥品代碼





健保藥品 AHFS 分類

- American Hospital Formulary System
- American Society of Health-care System Pharmacists
- 30 Classes in numeric system, e.g.
 - 04:00 Antihistamine drugs
 - 08:00 Anti-infective agents
 - 24:00 Cardiovascular drugs
 - 38:00 Disinfectants
 - 44:00 Enzyme
 - 60:00 Gold compound
 - 86:00 Smooth muscle relaxants



ATC Classification

Anatomical

Therapeutic

Chemical

Classification



Development

- Drug utilization research by Engel and Siderius, 1968
- Norwegian Medicinal Depot (NMD), 1970
 - ATC classification from the European Pharmaceutical Market Research Association (EPHMRA) classification system
 - Defined Daily Dose (DDD) also developed
- NLN published Nordic Statistics on Medicines using ATC/DDD methodology in 1976



Responsible Organization

- WHO Collaborating Center for Drug Statistics Methodology established in Oslo, 1982
- WHO International Working Group for Drug Statistics Methodology
 - Established by the WHO Division of Drug Management and Polices in 1996
 - Consists of 13 experts in clinical pharmacology, drug utilization, drug regulation, drug evaluation, statistics and medicine



Purpose of the ATC System

- Serve as a *tool* for drug utilization research in order to *improve quality of drug use*
- Presentation and comparison of drug consumption statistics at *international* and other levels
- The ATC/DDD system by itself is not suitable for guiding decisions about reimbursement, pricing and therapeutic substitution



The ATC Classification System

- First level:
 - 14 main organ or system groups
- Second and third levels:
 - Therapeutic/pharmacological
- Forth level:
 - Therapeutic/pharmacological/chemical
- Fifth level:
 - Chemical substance



The Main Groups (I)

- **A** Alimentary tract and metabolism
- **B** Blood and blood forming organs
- **C** Cardiovascular system
- **D** Dermatologicals
- **G** Genito-urinary system and sex hormone
- **H** Systemic hormonal preparations, excl. sex hormone
- **J** General anti-infectives for systemic use



The Main Groups (II)

- **L** Antineoplastic and immunomodulating agents
- **M** Musculo-skeletal system
- **N** Nervous system
- **P** Antiparasitic products, insecticides and repellents
- **R** Respiratory system
- **S** Sensory organ
- **V** Various



Example

- **A** Alimentary tract and metabolism
(1st level, anatomical main group)
- **A10** Drugs used in diabetes
(2nd level, therapeutic main group)
- **A10B** Oral blood glucose lowering drugs
(3rd level, therapeutic/pharm. group)
- **A10B F** Alpha glucosidase inhibitors
(4th level, chem./therap./pharm. group)
- **A10B F01** Acarbose
(5th level, subgroup for chemical substance)



ATC vs. AHFS

- For pharmaceutical classification by WHO
- Broader coverage of pharmaceutical products
- 5 structured levels
- Combination ingredients applicable
- For drug information compilation by ASHP
- US marketed products
- 3 levels, inconsistent, skewed structure
- Combination ingredients not applicable



AHFS Unclassified Drugs

- Alendronate
- Allopurinol
- Amantadine
- Azathioprine
- Bromocriptine
- Calcitonin
- Clomiphene
- Clodronate
- Cyclosporin
- Etidronate
- Flumazenil
- Leucovorin
- Glucosamine
- Ketoprofen
- Ketotifen
- Levodopa
- Lithium carbonate
- Piracetam



Example: Cardiovascular Drugs

C01	Cardiac therapy	24:04	Cardiac drugs
C02	Antihypertensives	24:06	Antilipemic agents
C03	Diuretics	24:08	Hypotensive agents
C04	Peripheral vasodilators	24:12	Vasodilating agents
C05	Vasoprotectives	24:16	Sclerosing agents
C07	Beta blocking agents	40:28	Diuretics
C08	Calcium channel blockers		
C09	Agents acting on the renin-angiotensin system		
C10	Serum lipid reducing agents		



Drug Utilization Studies

- How is the NHI pharmaceutical subsidy classified by ATC system?
- Quantitative studies
 - Pattern of drug utilization in NHI claim data
 - Utilization analysis of NSAIDs
 - Exclusion from reimbursement
- Qualitative studies
 - Assessment of potentially inappropriate prescriptions with lethal drug-drug interactions



NHI Formulary: Main system

Alimentary tract and metabolism	3310
General antiinfectives for systemic use	2582
Respiratory system	2518
Nervous system	2077
Dermatologicals	1824
Blood and blood forming organs	1722
Musculo-skeletal system	1625
Cardiovascular system	1531
Genito-urinary system and sex hormones	833
Systemic hormonal preparations, excl. sex hormones	661
Sensory organs	459
Antineoplastic and immunomodulating agents	401
Antiparasitic products, insecticides and repellents	193
Various	127



資料處理流程

處方及治療明細檔 (CD&DD檔; NHRI sampled)

1. Acode、ICD-9除錯
2. 扣除中牙醫之案件及就醫科別
3. 扣除casetype = 71~73、81、91

與處方醫令明細檔 (OO&DO檔) 聯結
，依識別碼合併治療明細及處方醫令

與健保藥品ATC編碼檔聯結，
使藥品健保碼對應其ATC code



資料處理流程（續）

↓

與醫事機構基本資料檔（HOSB檔）
聯結，依醫事機構代號歸併其層級別

↓

依ATC code分析

1. 各藥品類別之使用頻次與金額
2. 各層級之使用頻次與金額
3. 就門診用藥找出不適當之藥品併用

AHFS分類之申報金額統計 (88)

Code	AHFS藥理分類名稱	88年申報金額	%	88成長率
24	心臟血管藥物	12,202,035,740	19.30	18.66
08	抗感染劑	10,313,193,724	16.31	12.89
28	中樞神經系統藥物	8,530,703,878	13.49	15.75
56	腸胃道藥物	5,920,546,315	9.36	10.24
	其他	5,650,151,122	8.94	1.72
68	荷爾蒙劑與合成取代物質	4,307,299,752	6.81	21.34
40	電解質、卡洛里及水分平衡	4,178,781,461	6.61	12.54
12	自主神經系統藥物	2,752,926,998	4.35	13.03
92	未分類治療藥物	2,643,858,222	4.18	23.98
20	造血及凝血製劑	1,868,494,571	2.96	15.2
48	鎮咳劑、祛痰劑及痰液溶解劑	1,832,825,456	2.90	7.79
10	抗癌藥物	1,696,894,650	2.68	22.72
86	平滑肌鬆弛劑	801,842,147	1.27	11.37
80	血清、類毒素及疫苗類	527,920,773	0.83	37.23
	合計	63,227,474,807	100.00	14.22

劉見祥：全民健保藥品給付制度；藥價支付制度之公平與合理性研討會。臺北，2001。

ATC分類之申報金額統計 (88)

ATC類別名稱	88估計金額*	%	88成長率
Cardiovascular system	12,285,251,620	20.85	18.93
Alimentary tract and metabolism	9,566,327,380	16.24	12.93
General antiinfectives for systemic use	8,533,066,800	14.48	10.19
Nervous system	6,609,265,420	11.22	17.96
Blood and blood forming organs	5,124,718,520	8.70	6.31
Musculo-skeletal system	4,582,426,360	7.78	8.87
Respiratory system	4,354,346,100	7.39	6.28
Antineoplastic and immunomodulating agents	2,392,651,720	4.06	28.96
Genito-urinary system and sex hormones	1,773,185,320	3.01	26.99
Dermatologicals	1,229,745,600	2.09	12.42
Systemic hormonal preparations, excl. sex hormo	1,151,428,160	1.95	2.72
Sensory organs	858,448,180	1.46	5.94
Various	302,888,660	0.51	41.79
Antiparasitic products, insecticides and repellents	149,650,980	0.25	12.83
	58,913,400,820	100.00	13.52

**Extrapolated to population value*

Expenditure of Ambulatory Claim

ATC類別名稱 /%	八十六	八十七	八十八	八十九
Cardiovascular system	23.45	23.67	24.78	26.23
Alimentary tract and metabolism	19.24	18.83	18.77	17.41
Nervous system	11.65	12.16	12.54	12.63
Musculo-skeletal system	9.17	9.66	9.24	8.50
Respiratory system	8.51	8.83	8.20	7.81
Blood and blood forming organs	7.57	7.04	6.67	6.83
General antiinfectives for system	7.70	7.12	6.51	5.81
Antineoplastic and immunomod	2.73	2.65	3.09	4.08
Genito-urinary system and sex h	3.08	3.24	3.62	3.78
Dermatologicals	2.26	2.48	2.48	2.31
Systemic hormonal preparations	1.52	1.74	1.55	2.11
Sensory organs	2.16	1.92	1.79	1.69
Various	0.63	0.34	0.44	0.53
Antiparasitic products, insectici	0.32	0.31	0.31	0.29
Estimated cost (mNTD)	34,793	40,952	46,734	46,422
NHI report (mNTD)	48,143	54,631	61,082	62,927



Prescribing Frequency of Ambulatory Claim

ATC類別名稱 /%	八十六	八十七	八十八	八十九
Respiratory system	24.50	26.54	29.51	30.79
Alimentary tract and metabolism	24.41	23.77	23.64	23.02
Nervous system	13.15	12.66	11.97	11.92
General antiinfectives for systemic use	9.86	10.07	10.33	9.77
Musculo-skeletal system	9.07	9.02	8.54	8.55
Cardiovascular system	5.43	5.02	4.15	4.31
Blood and blood forming organs	4.65	4.20	3.45	3.14
Sensory organs	2.86	2.67	2.48	2.56
Dermatologicals	1.54	1.74	1.92	2.01
Systemic hormonal preparations, excluding sex hormones	2.20	2.14	2.01	1.91
Genito urinary system and sex hormones	1.74	1.72	1.65	1.70
Antiparasitic products, insecticides and acaricides	0.19	0.18	0.15	0.14
Various	0.31	0.16	0.12	0.10
Antineoplastic and immunomodulating agents	0.10	0.09	0.08	0.08

Incidence Rate of Drug Used in OPD

ATC類別名稱 /%	八十六	八十七	八十八	八十九
Respiratory system	63.73	81.71	116.33	114.37
Alimentary tract and metabolism	63.49	73.18	93.17	85.51
Nervous system	34.21	38.97	47.20	44.28
General antiinfectives for system	25.64	31.01	40.72	36.31
Musculo-skeletal system	23.59	27.78	33.66	31.74
Cardiovascular system	14.11	15.47	16.35	16.00
Blood and blood forming organs	12.09	12.94	13.59	11.68
Sensory organs	7.44	8.22	9.77	9.51
Dermatologicals	4.00	5.37	7.57	7.48
Systemic hormonal preparations	5.74	6.59	7.94	7.10
Genito urinary system and sex h	4.52	5.31	6.51	6.30
Antiparasitic products, insecticid	0.50	0.56	0.60	0.51
Various	0.80	0.48	0.47	0.36
Antineoplastic and immunomod	0.25	0.27	0.32	0.31
Consultation Counts	489,604	520,066	537,896	524,592

Incidence rate: Counts of drug claim/Consultation counts (%)

Expenditure of in-patient claim

ATC類別名稱 /%	八十六	八十七	八十八	八十九
General antiinfectives for systemic	44.54	44.09	45.09	46.00
Blood and blood forming organs	19.24	17.70	16.48	15.43
Antineoplastic and immunomodul	5.65	7.04	7.78	8.55
Nervous system	5.09	5.71	6.15	6.26
Alimentary tract and metabolism	7.41	6.96	6.52	6.02
Cardiovascular system	5.57	5.82	5.79	5.67
Respiratory system	3.89	4.40	4.28	4.18
Systemic hormonal preparations,	3.27	3.72	3.49	3.53
Musculo-skeletal system	2.47	2.30	2.15	2.02
Various	0.66	0.70	0.79	0.87
Genito-urinary system and sex ho	0.75	0.62	0.68	0.64
Dermatologicals	0.76	0.70	0.58	0.61
Sensory organs	0.65	0.21	0.18	0.17
Antiparasitic products, insecticide	0.05	0.05	0.04	0.04
NHI report (mNTD)	11,948	13,322	14,798	15,724

Cost & Frequency of Injectable NSAIDs – OPD, 1999

NSAIDs Injections	醫學中心		區域醫院		地區醫院		基層醫療		Sum of cost
	品項數	%	品項數	%	品項數	%	品項數	%	
Ketoprofen	4	6.89	11	7.82	21	65.37	28	19.92	138,954
Piroxicam	1	0.44	9	10.58	15	54.25	18	34.74	44,768
Ketorolac	1	8.43	1	43.41	1	41.93	2	6.22	25,593
Diclofenac	3	5.68	5	22.75	17	42.38	24	29.19	25,590
Tenoxicam	2	12.30	4	23.28	4	61.07	3	3.36	19,225
Ibuprofen	1	6.25	2	47.92	2	39.57	1	6.25	6,623
	12	6.19	32	15.41	60	57.93	76	20.46	260,753

NSAID injections	醫學中心		區域醫院		地區醫院		基層醫療		Sum of frequency
	品項數	%	品項數	%	品項數	%	品項數	%	
Ketoprofen	4	1.30	11	2.49	21	35.19	28	61.02	8,514
Diclofenac	3	2.44	5	10.52	17	20.94	24	66.09	4,704
Piroxicam	1	0.13	9	3.95	15	26.66	18	69.26	1,594
Tenoxicam	2	10.96	4	23.31	4	60.96	3	4.78	356
Ketorolac	1	7.74	1	37.37	1	43.77	2	11.11	297
Ibuprofen	1	6.52	2	50.00	2	36.96	1	6.52	46
	12	1.89	32	6.36	60	30.75	76	61.00	15,511

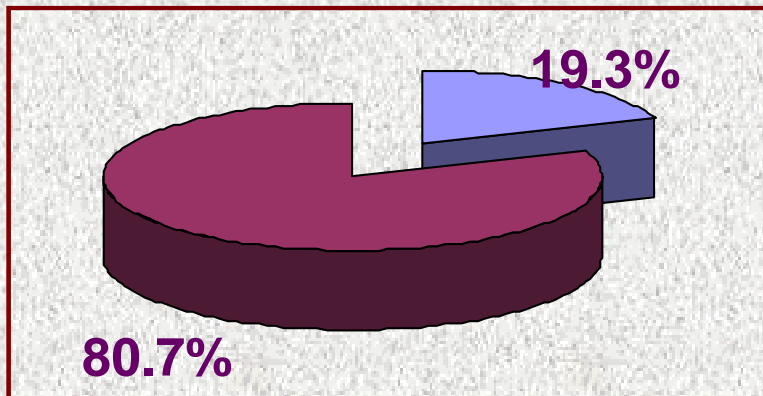


Exclusions from Reimbursement – UK Experiences

- **Automatic reimbursement until 1985**
- **10 more categories excluded from 1992**
 - Antacid, antidiarrheals and laxatives
 - Anti-allergies, Cough and cold remedies
 - Appetite suppressants
 - Minor analgesics, topical skin and anti-rheumatic products
 - Products for ear and nose infections and of the vulva and vagina
 - Vitamin and anti-anaemics
 - Hypnotics and anxiolytics
 - Oral contraceptives

NHI Covers Everything?

629.3億



藥品類別	%
感冒咳嗽製劑	4.41
制酸劑	3.21
整腸健胃	3.16
安眠鎮靜劑	3.15
維生素礦物質	1.55
消炎止痛解熱劑	1.27
皮膚用藥	1.25
保肝利膽劑	0.93
潤滑用眼藥水	0.33



Reimbursement categories, co-payment levels and public spending in Belgium in 1994

	Description	Co-payment % of retail		Amt of public funding (bBeF)	
		Reg.	High	Rx.	Hosp.
A	Life-saving drugs	0	0	5.722	6.238
B	Essential medicines (antihypertensives, antirheumatics, antidepressants)	25	15	34.731	9.924
C	Drugs to discomfort diseases or with limited efficacy	50	50	0.083	0.035
Cs	Antihistamines and some vaccines	60	60	0.04	0.006
Cx	OC and cerebrovascular agents	90	80	1.317	0.030



Prescriptions with Lethal Drug-drug Interactions

- Indicator drugs

- Terfenadine
- Macrolide antibiotics
- Imidazole antifungals
- Astemizole
- Cisapride

- All metabolized by CYP3A4

- Lethal interaction

- Cardiac arrhythmia
- QT prolonged



Prescriptions with Lethal Drug-drug Interactions

不當併用件數/年度	86	87	88
Cisapride + Clarithromycin	1	6	6
Cisapride + Erythromycin	91	126	157
Cisapride + Troleandomycin	2	2	11
Cisapride + Itraconazole	2	1	1
Cisapride + Ketoconazole	4	3	0
Erythromycin + Terfenadine	189	241	224
Erythromycin + Astemizole	115	164	114
Erythromycin + Warfarin	0	0	1
Clarithromycin + Terfenadine	1	0	0
Ketoconazole + Terfenadine	48	58	31
Ketoconazole + Astemizole	41	31	15
Ketoconazole + Warfarin	1	0	0
Troleandomycin + Terfenadine	9	21	17
Troleandomycin + Astemizole	9	5	3
Itraconazole + Terfenadine	5	6	0
總計	518	664	580



Drug Utilization Studies

- The marketing, distribution, prescription and use of drugs in a society, with special emphasis on the resulting *medical*, *social*, and *economic* consequences.

~ WHO, 1977

- Health authorities
- Pharmaceutical industry
- Clinical professionals
- Academics in public health, social sciences, economy
- Consumers

Problems

- Hidden use of drug
- Unit of measurement
 - Defined daily dose
- Incomplete diagnosis link
- Validity of the data



781	1221	822
796	1031	832



謝謝

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敬請指教

