

藥事照護簡介

臺大醫院藥劑部 臨床藥事組組長

吳建志

定義

- 藥師提供照護，讓病人的藥品使用最適化，並改善健康相關成效
 - **Pharmaceutical care is the pharmacist's contribution to the care of individuals in order to optimize medicines use and improve health outcomes.**

藥事照護定義 by ASHP (美國醫事機構藥師學會)

有責任的提供藥物治療以得到具體的成效，改善病人生活品質，
這些具體成效包括

- (1) 治癒一種疾病，
- (2) 消除或減緩一個病人的症狀，
- (3) 阻止或減緩一種疾病的進程，
- (4) 預防一種疾病或症狀。

" Pharmaceutical Care is defined as the *responsible* provision of drug therapy for the purpose of achieving *definite outcomes* that improve a patient's quality of life. These outcomes are:

- (1) *cure of a disease,***
- (2) *elimination or reduction of a patient's symptomatology,***
- (3) *arrest or slowing of a disease process, or***
- (4) *prevention of a disease or symptomatology."***

藥事照護的主要元素與基礎

- 主要元素
 - 藥品相關
 - 辨識潛在與實際發生的藥品相關問題
 - 解決實際發生的藥品相關問題
 - 預防潛在的藥品相關問題
 - 照護
 - 成效
 - 生活品質
- 基礎
 - 信守與病人及醫師承擔相同責任的信念與承諾，讓藥物治療得到最佳的成效
 - 奠定專業與病人的信賴關係
 - 有計畫、介入處置與成效之正式紀錄

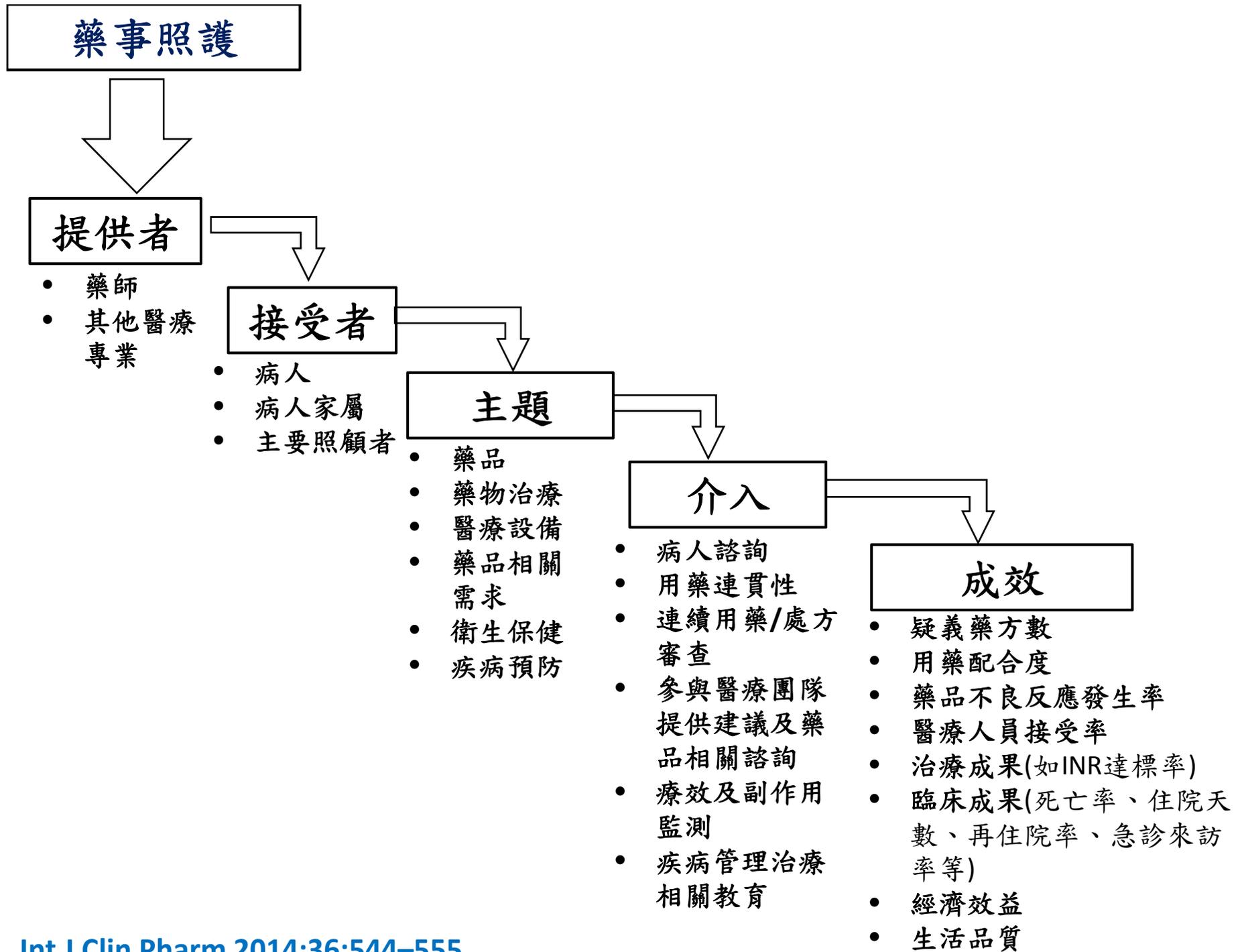
藥事服務vs.藥事照護

• 藥事服務

- 藥品選擇與採購
- 藥品儲存
- 處方審查
- 藥品調劑與製備
- 用藥指導

• 藥事照護

- 病人諮詢
- 用藥連貫性
- 連續用藥/處方審查
- 參與醫療團隊提供建議及藥品相關諮詢
- 療效及副作用監測
- 疾病管理治療相關教育



案例

- **70歲男性，過去病史有急性骨髓性白血病及慢性阻塞性肺炎，此次因敗血性休克入住加護病房治療，目前已插管並接受升壓劑及連續性靜脈替代療法治療，使用藥品如下**
 - **Cefepime 1 g IV qd**
 - **Vancomycin 1 g IV qd**
 - **Dopamine 400mg/250 mL, 20 mL/hr cIF**
 - **Morphine 100 mg cIF qd with titration**
 - **Nutriflex 1000 mL cIF qd**

請問藥師針對病人目前狀況，有何建議？

藥事介入種類-建議處方

- 用藥劑量/頻次問題
- 用藥期間/數量問題(包含停藥)
- 用藥途徑或劑型問題
- 建議更適當用藥/配方組成
- 給藥問題(速率、輸注方式、濃度或稀釋液)
- 適應症問題
- 用藥禁忌問題(包括過敏史)
- 藥品併用問題
- 藥品交互作用
- 疑似藥品不良反應
- 藥品相容性問題
- 不符健保給付規定
- 其他

藥事介入種類- 建議處方,用藥劑量/頻次問題

序號	狀態	階段	類	開方日	處方號	學名	商品名	劑量	單位	頻率	途徑	天數	線上	批次	
0396	停用	一般	L	20181028	N0474	Cefepime HCl	Maxipime 500 mg/vial	1000	mg	QN	IV	0	0	2	詳

選擇藥事原因: 建議修改處方 用藥劑量/頻次問題 TPN:

文字內容: (限80英文字或40中文字)

評估內容: (限1500英文字或750中文字)
Profound shock, MDRAB+CRKP bacteremia, CVVH use, adjust to CVVH dose.

藥師建議: 修改處方 補充說明: (限400英文字或200中文字)

建議	藥名	劑量	單位	頻率	途徑	天數	總量	稀釋液	體積	濃度	速度	流速	時間
修改劑量/頻率/濃度/速度 <input type="checkbox"/>	Cefepime HCl (Maxipime 500 mg/vial)	1000	mg	Q6H	IV			無 <input type="checkbox"/>					5
醫師接受藥師建議 <input checked="" type="checkbox"/>	拷 <input type="checkbox"/> 清 <input type="checkbox"/> Cefepime HCl (Maxipime 500 mg/vial)	1000	mg	Q6H	IV			無 <input type="checkbox"/>					5

處理結果: 醫師接受藥師建議 意見: (限200英文字或100中文字)

作業藥局: 總院東址UDD住院藥局 建立者: 吳建志 2018/10/29 11:44:40 問題來源: 監測發現 資料狀態: 結案

送核定時間: 2018/10/29 11:44:40 核定時間: 2018/10/31 15:28:06 核定者: 戴志勳 有效結案 一般

藥事介入種類- 建議處方,建議更適當用藥

序號	狀態	階段	類	開方日	處方號	學名	商品名	劑量	單位	頻率	途徑	天數	線上	批次																	
0088	停用	一般	M	20181113	T0040	Nutriflex 1000mL Lyo-Povigent 4 mL Addaven 10 mL	Nutriflex 1014 mL/bag (TPN)	1014	mL	QD	cIF (CVC)	1	1	1	詳																
選擇藥事原因:		建議修改處方			建議更適當用藥/配方組成			TPN:																							
文字內容:(限80英文字或40中文字)																															
評估內容:(限1500英文字或750中文字)																															
Bowel perforation, profound shock since last night, lactic acidosis and hyperammonemia, CVVH use now, suggest hold TPN under profound shock status, may initiate TPN after condition stable.																															
藥師建議:		修改處方			補充說明:(限400英文字或200中文字)			顯示補充說明																							
學名搜尋:				選				商品名搜尋:				選																			
建議:		修改藥品/配方組成			藥名			劑量		單位		頻率		途徑		天數		總量		稀釋液		體積		濃度		速度		流速		時間	
結果:		醫師接受藥師建議			Dextrose (警 Glucose inj 50% 500 mL/bag)			500		mL		QD		cIF						無						21		1440			
處理結果:		醫師接受藥師建議			Dextrose (警 Glucose inj 50% 500 mL/bag)			500		mL		QD		cIF						無						21		1440			
意見:(限200英文字或100中文字)																															
With Iyo-povigent																															
作業藥局: 總院東址UDD住院藥局				建立者: 吳建志 2018/11/13 12:18:38 問題來源: 監測發現				資料狀態: 結案																							
送核定時間: 2018/11/13 12:18:38				核定時間: 2018/11/15 14:49:37				核定者: 戴志勳				有效結案 一般																			

藥事介入種類-主動建議

- 建議用藥/建議增加用藥
- 建議靜脈營養配方
- 用藥劑量/頻次問題

藥事介入種類- 主動建議, 建議增加用藥

Pharmacy Note
2018/04/18 07:42
Subjective:
Dyspnea
Objective:
The 63-year-old female Underlying disease: ESRD, DM, PAOD Feeding status: Enteral feeding support Major risk factor: Mechanical ventilation use > 48hr (+) Coagulopathy (Plt < 50,000, INR>1.5, aPTT>50), not induced by medication (-) GI bleeding or ulceration within 12 months of admission (-) EGD report: Minor risk factor: Steroid use (-) Shock (+) Severe sepsis (-) Renal failure (+) Hepatic failure (-) NPO (-) Antiplatelet or anticoagulation (+), DAPT
Stress ulcer prophylaxis
Assessment:
High risk of stress ulcer (1 major risk factor or 2 minor risk factors)
Enteral feeding (+)
Plan:
Give takepron 30mg po qd for stress ulcer prophylaxis
記錄者
吳建志藥師

藥事介入種類-建議監測

- 藥品療效
- 藥品不良反應
- 藥品血中濃度

藥事介入種類- 建議監測,藥品血中濃度

Pharmacy Note

2018/09/07 14:04

Subjective:

Dyspnea

Objective:

This 75 y/o male had underlying disease as old TB, COPD, PAH

Indication of vancomycin: empirical use

Vancomycin loading dose: 1000mg stat IF on 2018/09/03 22:00

Vancomycin maintenance dose: 750mg q12h IF from 2018/09/04 9:00

Associated lab data:

BH:169 cm, BW:52.8 kg, SCr: 0.6 mg/dL,

WBC: 11420/mm³(0906), CRP: 7.86 mg/dL(0906), fever (-), U/O: ~1000 mL/day

Culture results: pending

Existed catheter:(-)

Trough level and level time: 13.85 mcg/mL at 9:31 on 9/7

Vancomycin Therapeutic Drug Monitoring

Assessment:

Therapeutic range of vancomycin: trough 10-20 mcg/mL

Respiratory distress, no significant culture evidence.

Plan:

Please keep vancomycin dose as 750mg q12h.

Pursue culture results, may check procalcitonin to decide the duration of vancomycin use.

Monitor renal function periodically.

記錄者

吳建志藥師

藥事介入種類-用藥連貫性

- 藥歷審核與整合
- 藥品辨識/自備藥辨識
- 病人用藥遵從性問題

藥事介入種類： 用藥連貫性

Subjective:

ADL independent before admission, taking medicine by patient himself independently. However, his compliance on medication (including inhalers for COPD) is unknown according to his family.

Objective:

Admission for COPD AE

Past medication use

[OPD] Neuro 邱銘章 (2018/10/16 連處三個月)

Methycobal 500 mcg/cap 1 cap QD PO 28天 28 cap

Rivotril 0.5 mg/tab 1 tab PRN PO 28天 15 tab (2016/11/29 因tremor急診後開立)

Aricept FC 5 mg/tab 1 tab HS PO 28天 28 tab

Eltroxin 100 mcg/tab 1 tab QD PO 28天 28 tab

[OPD] Chest 徐志育 (2018/5/28)

Ativan 0.5 mg/tab 1 tab HS PO 28天 28 tab

Predonine 5 mg/tab 1 tab TID PO 7天 21 tab

Relvar Ellipta Inh Powder 1 dose QD (連處三個月)

[外院]

Beclomethasone, formoterol 2 puff BID (商品名: Foster)

Fenoterol, ipratropium 2 puff PRN (商品名: Berodual)

Lercanidipine 10 mg QD for HTN

Dimemorfan 10 mg BID

Ambroxol 30 mg BID

Theophylline 125 mg BID

Stazyme 1 tab TID for 消化

Omeprazole 20 mg QD

Strocain TID AC

Kascol 40 mg TID

NG(+)

Lab data:

BUN:21.3mg/dl (1024): CRE:1.2mg/dl (1024): ALT:29U/l (1024):

Medication reconciliation

Assessment:

There's concern on his compliance on medication. COPD AE may be related to pneumonia and poor drug compliance.

No renal and hepatic function.

Plan:

1. May resume Eltroxin, Foster(beclomethasone+formoterol), Berodual(fenoterol+ipratropium) PRN, Aricept. Resume lercanidipine if BP is high.

3. The compliance of medication (including inhalers for COPD) needs to be emphasized to the patient or his family. May educate patient after extubation.

藥事介入成效

- 臨床成果

- 減少用藥疏失、可能發生的不良反應(ADR)及住院天數等等

- 節省花費

- 直接的藥費節省

- 例如用藥劑量/頻次問題、用藥期間/數量問題、用藥途徑或劑型問題、適應症問題及藥品併用問題等，可以保守計算一天節省相關藥品花費。

- 間接的醫療費用節省

- 減少ADR導致的住院所衍生的花費

藥事介入成效-間接醫療費用節省

- 每個ADR可延長住院天數2天
- 加護病房病房費約7000元/天
- 根據不同藥事介入，若未介入發生ADR的機率(P)為0/0.01/0.1/0.4/0.6
- 預防ADR的件數 = $P * N$ (介入件數)
- 醫療費用節省 = $2 * 7000 * P * N$

建議處方

用藥劑量/頻次問題	0.6
用藥期間/數量問題	0.1
用藥途徑或劑型問題	0.1
給藥問題(速率、輸注方式、濃度或稀釋液)	0.4
適應症問題	0.4
用藥禁忌問題	0.6
藥品併用問題	0.4
建議更適當用藥/配方組成	0.4
藥品交互作用	0.6
疑似藥品不良反應	0.6
藥品相容性問題	0.4
不符健保給付規定	0
其他	0

建議監測

藥品療效	0.4
藥品不良反應	0.4
藥品血中濃度	0.6

主動建議

用藥劑量/頻次問題	0.6
用藥期間/數量問題(包含停藥)	0.1
用藥途徑或劑型問題	0.1
建議更適當用藥/配方組成	0.4
藥品不良反應評估	0.6
建議用藥/建議增加用藥	0.4
建議藥物治療療程	0.1
建議靜脈營養配方	0.4

用藥連貫性

藥歷審核與整合	0.4
藥品辨識/自備藥辨識	0
病人用藥遵從性問題	0.6

未介入發生ADR的機率

The cost-saving effect and prevention of medication errors by clinical pharmacist intervention in a nephrology unit

Chia-Chi Chen, MSCP^a, Fei-Yuan Hsiao, PhD^{a,b,c}, Li-Jiuan Shen, PhD^{a,b,c}, Chien-Chih Wu, MSCP^{a,c,*}

Abstract

Medication errors may lead to adverse drug events (ADEs), which endangers patient safety and increases healthcare-related costs. The on-ward deployment of clinical pharmacists has been shown to reduce preventable ADEs, and save costs. The purpose of this study was to evaluate the ADEs prevention and cost-saving effects by clinical pharmacist deployment in a nephrology ward.

This was a retrospective study, which compared the number of pharmacist interventions 1 year before and after a clinical pharmacist was deployed in a nephrology ward. The clinical pharmacist attended ward rounds, reviewed and revised all medication orders, and gave active recommendations of medication use. For intervention analysis, the numbers and types of the pharmacist's interventions in medication orders and the active recommendations were compared. For cost analysis, both estimated cost saving and avoidance were calculated and compared.

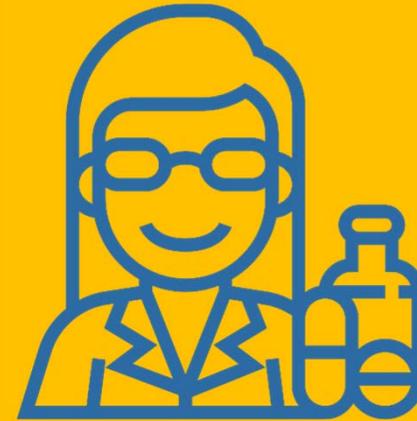
The total numbers of pharmacist interventions in medication orders were 824 in 2012 (preintervention), and 1977 in 2013 (postintervention). The numbers of active recommendation were 40 in 2012, and 253 in 2013. The estimated cost savings in 2012 and 2013 were NT\$52,072 and NT\$144,138, respectively. The estimated cost avoidances of preventable ADEs in 2012 and 2013 were NT\$3,383,700 and NT\$7,342,200, respectively. The benefit/cost ratio increased from 4.29 to 9.36, and average admission days decreased by 2 days after the on-ward deployment of a clinical pharmacist.

The number of pharmacist's interventions increased dramatically after her on-ward deployment. This service could reduce medication errors, preventable ADEs, and costs of both medications and potential ADEs.

Abbreviations: ADE = adverse drug events, NHI = National Health Insurance, NTUH = National Taiwan University Hospital.

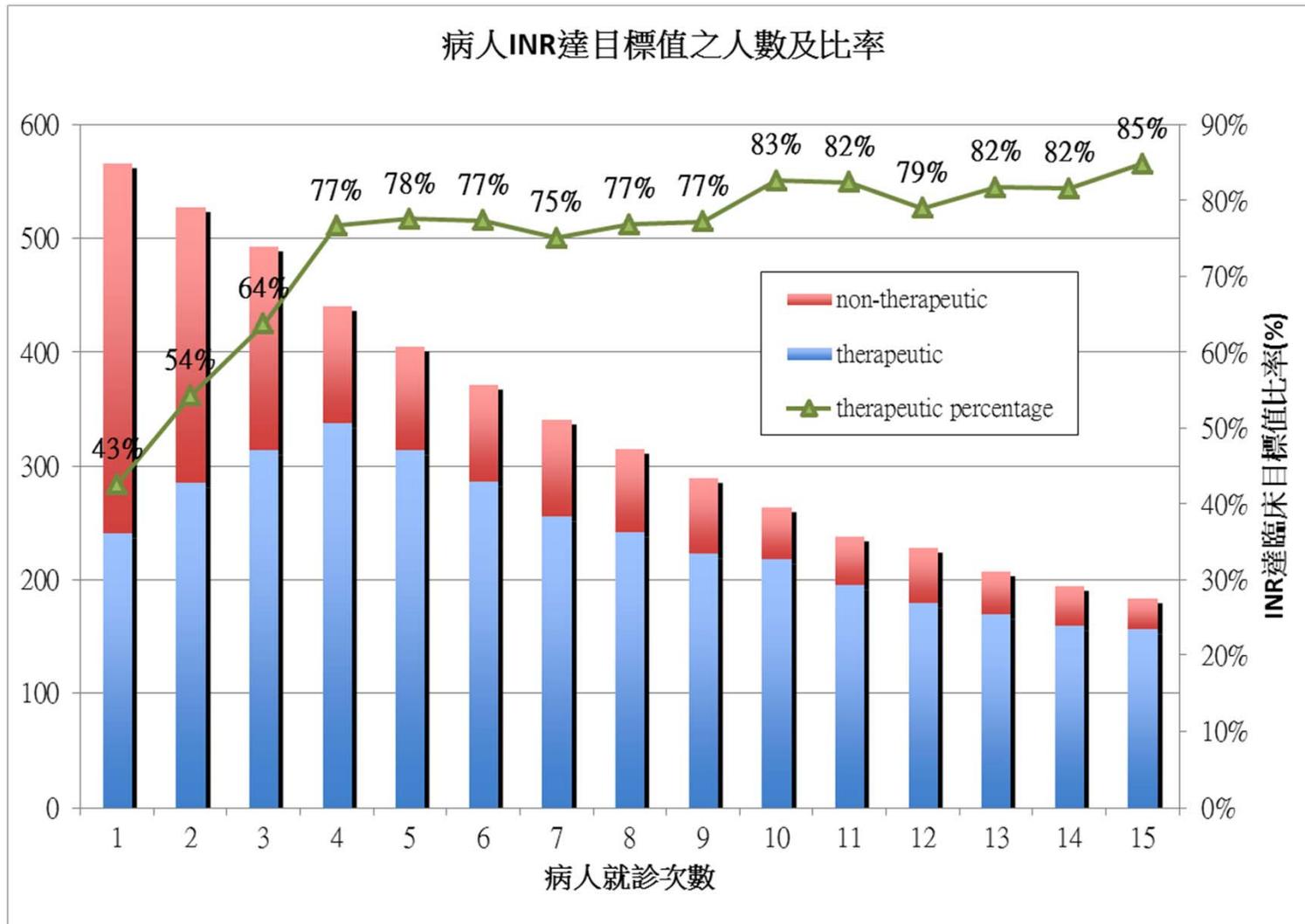
Keywords: clinical pharmacist, cost saving, medication error, nephrology, preventable adverse drug event

總住院人次：813
總處方數：39256 筆
藥師介入修改處方件數：824
主動建議數：37
直接藥費節省：52,072
間接藥費節省：3,383,700
平均住院天數：13.22
Benefit/cost ratio: 4.29



總住院人次：937
總處方數：40580 筆
藥師介入修改處方件數：1977
主動建議數：253
直接藥費節省：144,138
間接藥費節省：7,342,200
平均住院天數：11.10
Benefit/cost ratio: 9.36

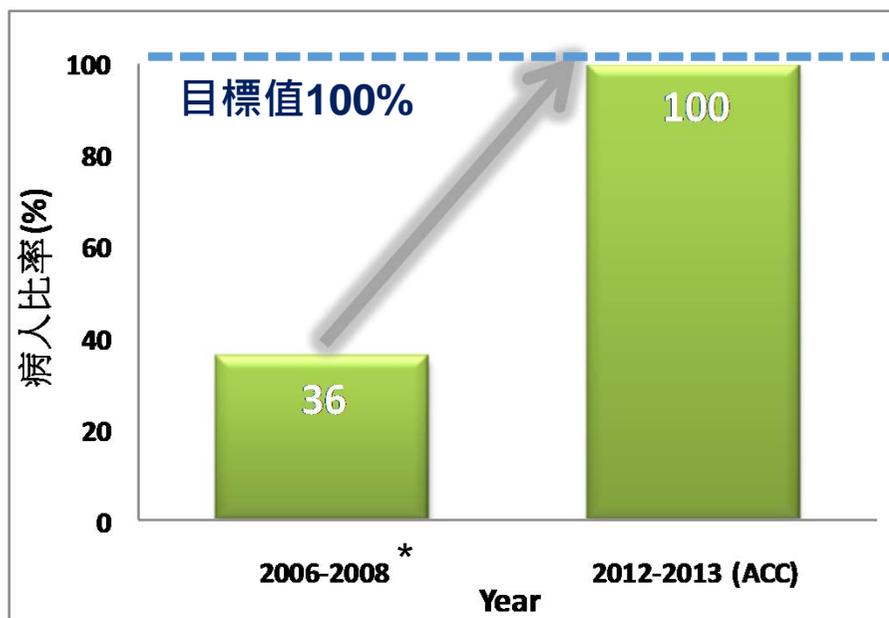
藥師抗凝血門診



病人接受規律性 INR 檢測比率

$$\text{目標達成率} = \left| \frac{\text{改善前}36 - \text{改善後}100}{\text{改善前}36 - \text{目標值}100} \right| \times 100\% = 100\%$$

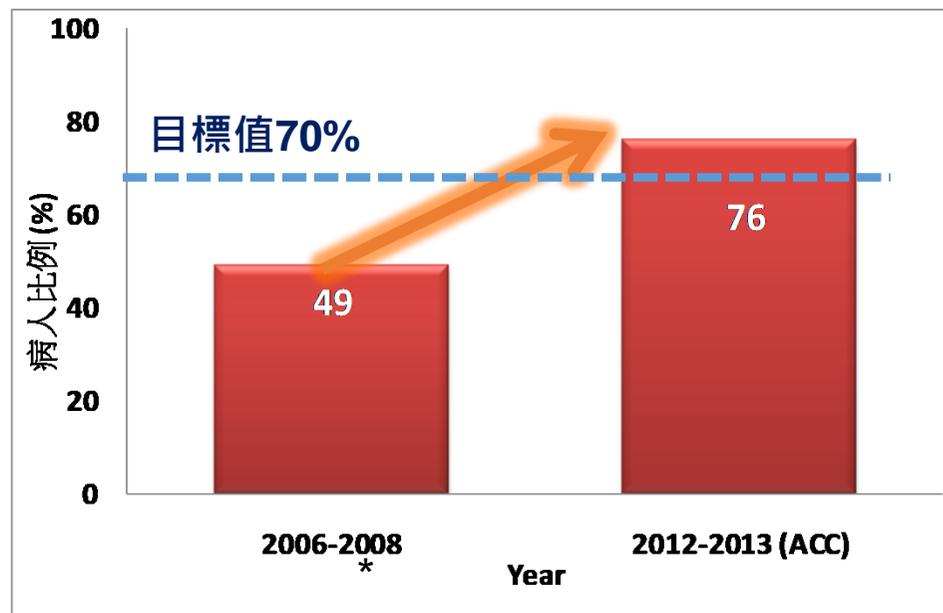
$$\text{進步率} = \left| \frac{\text{改善前}36 - \text{改善後}100}{\text{改善前}36} \right| \times 100\% = 178\%$$



病人達到 INR 目標值比率

$$\text{目標達成率} = \left| \frac{\text{改善前}49 - \text{改善後}76}{\text{改善前}49 - \text{目標值}70} \right| \times 100\% = 129\%$$

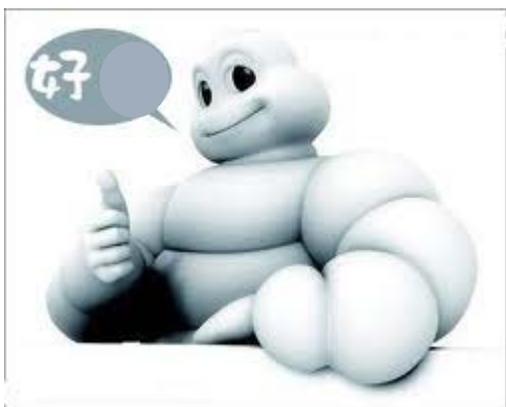
$$\text{進步率} = \left| \frac{\text{改善前}49 - \text{改善後}76}{\text{改善前}49} \right| \times 100\% = 55\%$$



* 臺大臨藥所碩士論文 (周等人)

高滿意度

病人對本院創新之抗凝血藥品共同照護模式感到非常滿意。得分為 4.57 ± 0.50 (滿分為5分), N=49。



病人對疾病及warfarin的認知程度顯著進步

病人對warfarin的認知程度及格率，從 **19.1%** 增加為 **74.5%** ($p < 0.0001$)，N=47。
進步率為**290%**。



Article

Cost-effectiveness of the pharmacist-assisted warfarin monitoring program at a Medical Center in Taiwan

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**遞增成本效果比值(ICER) < 1 國民生產毛額(GDP)
藥師抗凝血門診非常符合經濟效益。**

ICER: incremental cost-effectiveness ratios; GDP: gross domestic product



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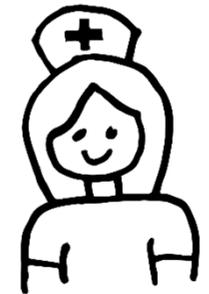
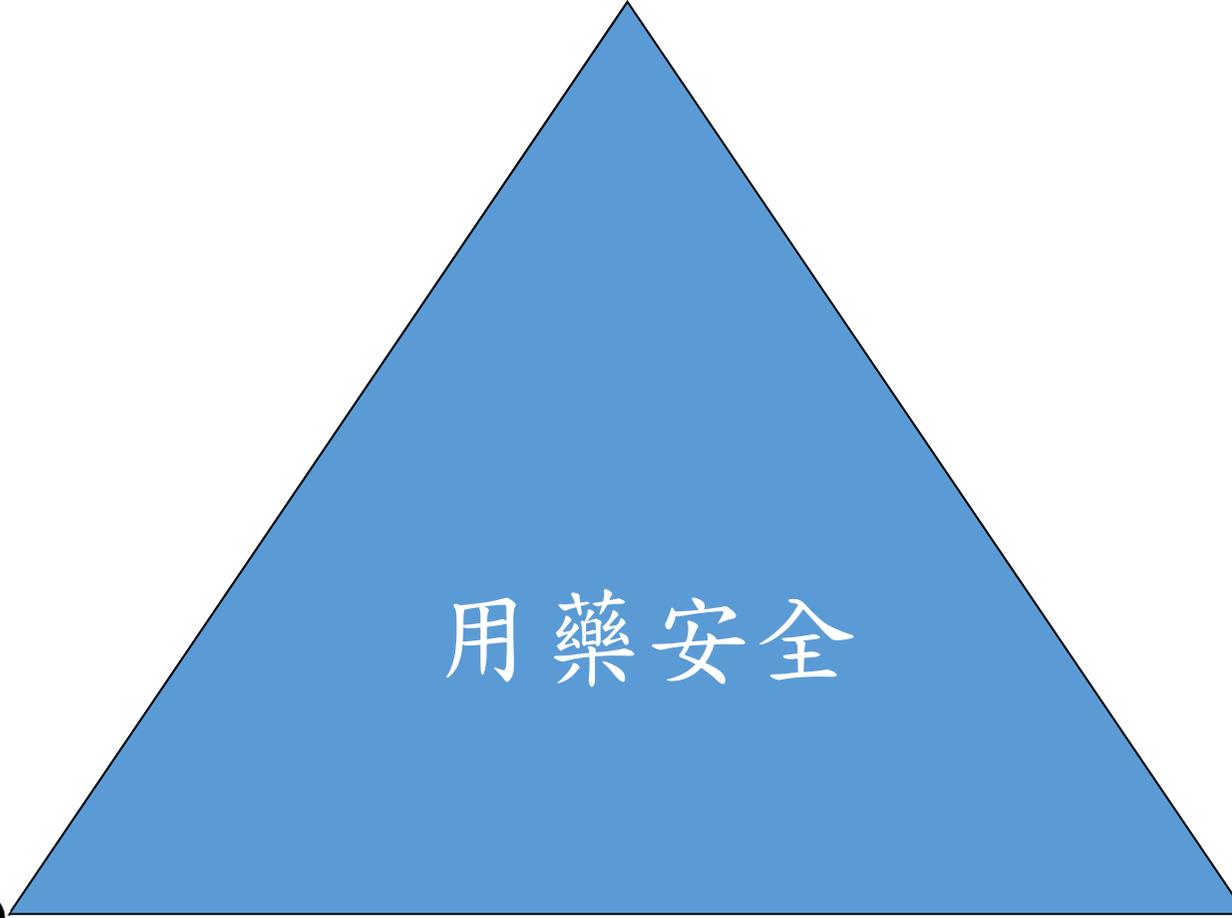
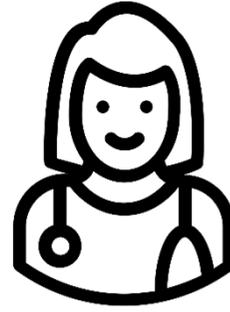
ORIGINAL ARTICLE

Economic outcomes of pharmacist-physician medication therapy management for polypharmacy elderly: A prospective, randomized, controlled trial



Hsiang-Wen Lin ^{a,b,c,*}, Chih-Hsueh Lin ^d, Chin-Kai Chang ^e,
Che-Yi Chou ^f, I-Wen Yu ^g, Cheng-Chieh Lin ^{d,h}, Tsai-Chung Li ⁱ,
Chia-Ing Li ^j, Yow-Wen Hsieh ^{a,b}

藥師介入老人用藥整合門診，能顯著的減少醫療支出
Benefit/cost ratio = 3.53:1



增加藥品療效
減少用藥疏失、藥品不良反應及相關醫療支出