# 药师参与慢病服务成效及经济学评估

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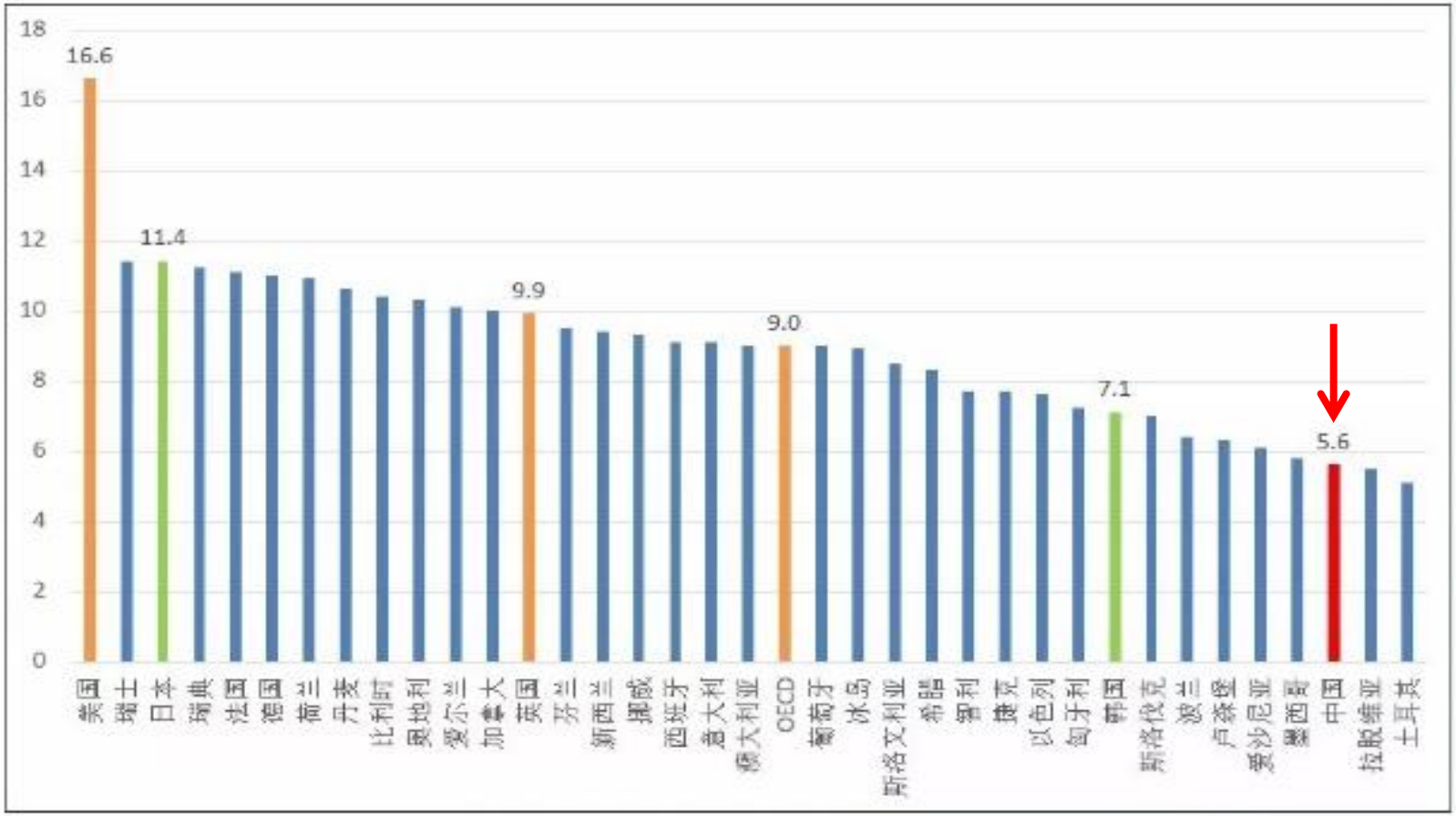
# 主要内容

- 概 要
- 药物比较的成本效果分析
- 慢病管理效果及经济学评价
- 抗凝药学服务经济学评价

# 各国卫生总费用占GDP的比例



# 国家重点监控辅助用药

| 序号 | 药品通用名 |
| --- | --- |
| 1 | 神经节苷脂 |
| 2 | 脑苷肌肽 |
| 3 | 奥拉西坦 |
| 4 | 磷酸肌酸钠 |
| 5 | 小牛血清去蛋白 |
| 6 | 前列地尔 |
| 7 | 曲克芦丁脑蛋白水解物 |
| 8 | 复合辅酶 |
| 9 | 丹参川芎嗪 |
| 10 | 转化糖电解质 |
| 11 | 鼠神经生长因子 |
| 12 | 胸腺五肽 |
| 13 | 核糖核酸II |
| 14 | 依达拉奉 |
| 15 | 骨肽 |
| 16 | 脑蛋白水解物 |
| 17 | 核糖核酸 |
| 18 | 长春西汀 |
| 19 | 小牛血去蛋白提取物 |
| 20 | 马来酸桂哌齐特 |

# 质变医疗的核心-价值医疗


**“价值医疗”**由美国哈佛大学商学院迈克尔.波特在2011年提出。

**“价值医疗”**是指如何在一定成本下获得最佳的治疗效果，卫生经济学专家将其称为“最高性价比的医疗”，倡导从传统医疗服务转型为“以人为本的一体化服务（PCIC)”。

迈克尔.波特：
美国竞争传略和竞争力研究领域权威专家

# 价值医疗如何实现？

华中科技大学同济医学院附属协和医院

## ➢ 遵循价值方程

# 药物经济学相关问题?

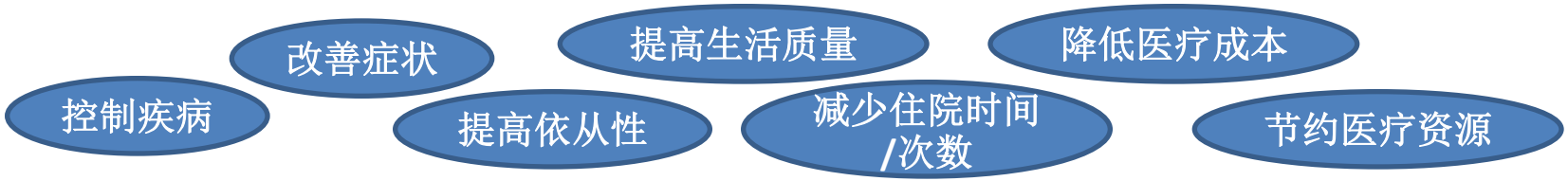
- 抗凝门诊：药师主导 vs 医师主导
- 房颤：利伐沙班 vs 华法林
- 肝损害：不同保肝方案比较
- 颅内感染：利奈唑胺 vs 万古霉素
- 癫痫：丙戊酸钠 vs 托吡酯
- 应激性溃疡：PPI vs H2-拮抗剂
- 非小细胞肺癌：克唑替尼 vs 化疗方案

# 成本-效果分析

- **成本效果分析**：以特定的临床治疗目的或临床效果为指标，比较不同治疗方案单位治疗效果的成本高低。
- **常用的评价方法**：成本-效果的比值(CER)和增量成本-效果比值（ICER）
- **CER**：单个治疗单位所需的成本（ 如治愈率、死亡率、生命延长时间、血压降低值等）；
- **ICER**：增加一个单位的效果（QALY，质量生命年）所需增加的成本。
- **劣势**：受其效果指标的限制，无法进行不同临床效果之间的比较。
- **优势**：简单易懂，易为临床 医务人员掌握和接受，因此应用较为广。

# 药物治疗管理

- **药物治疗管理**：有药学专业技术优势的药师对患者提供用药教育、咨询指导等一系列专业化服务，从而提高用药依从性、预防患者用药错误，最终培训患者进行自我用药管理，以提高疗效。
- **目标受益人群**：患有多种慢病例如糖尿病、高血压、高尿酸、充血性心衰等的个体。




[1] 药师在不同学科/环境下开展药学服务效果的系统评价. China Pharmacy 2016

# 药物经济学研究的类型划分

**药物经济学研究类型**

- **研究内容**
  - 疾病成本研究（cost of illness, COI）
  - 成本产出分析（Cost-Outcome Analysis）
  - 预算影响分析（budget impact analysis, BIA）
- **数据收集时间**
  - 前瞻性（prospective）研究
  - 回顾性（retrospective）研究
- **干预治疗方案**
  - 试验性（trial-based study）研究
  - 观察性（observational study）研究
- **数据来源和数据处理**
  - 基于病人水平数据研究
  - 模型法研究（modeling study）
  - 混合研究（hybrid study）
  - 二次文献研究（literature review）

# 一、药物比较的成本效果分析

1.别嘌醇vs非布司他

2.注射用保肝药物比较

3. 利伐沙班 vs 华法林

# 1.降尿酸药物治疗经济学评价

## HLA-b*5801指导痛风初始降尿酸治疗经济性

## (别嘌呤醇vs非布司他)成本-效果分析

Contents lists available at ScienceDirect

Seminars in Arthritis and Rheumatism

journal homepage: www.elsevier.com/locate/semarthrit

# The cost-effectiveness of HLA-b*5801 screening to guide initial urate-lowering therapy for gout in the United States☆,☆☆

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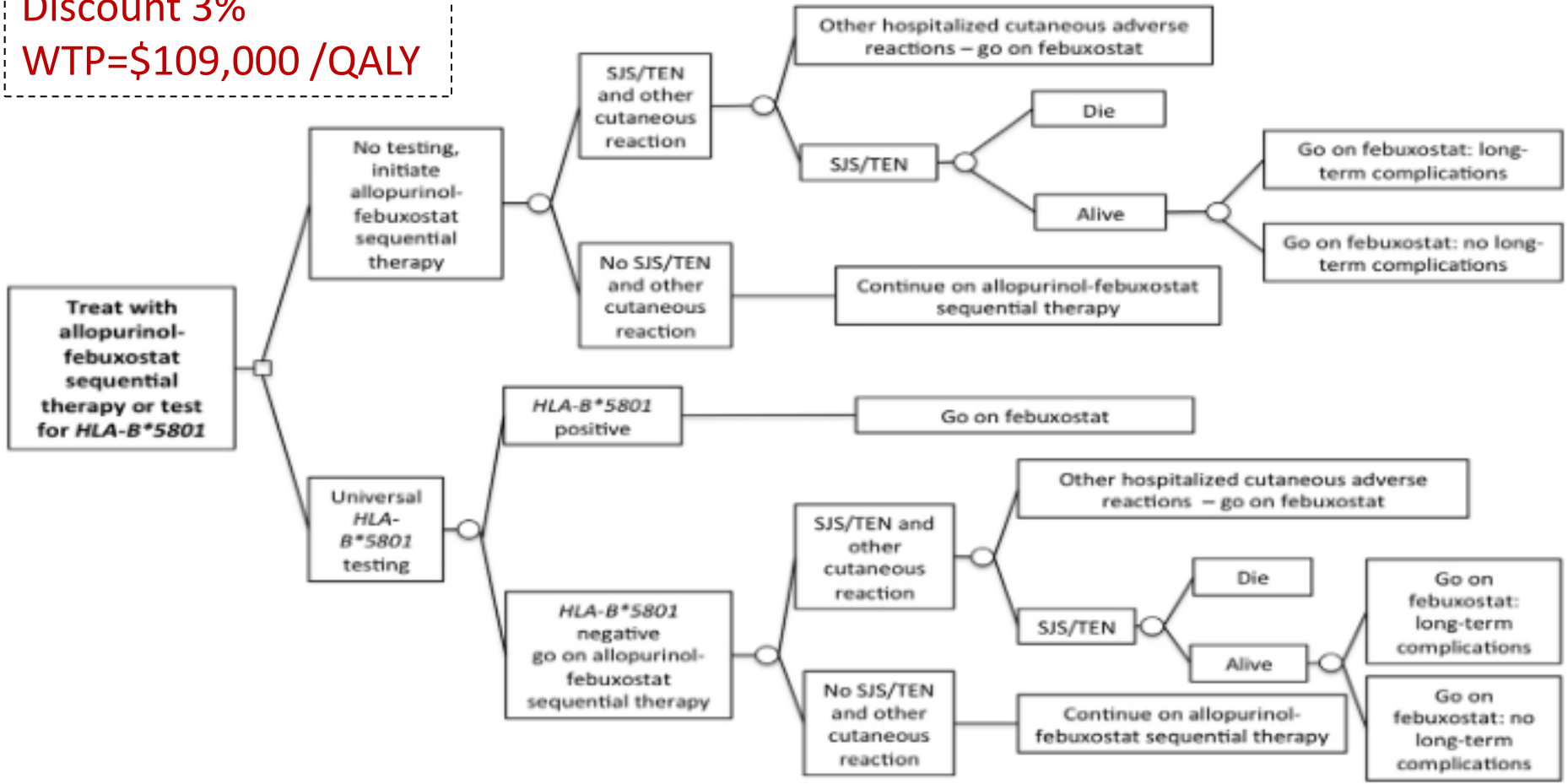
# HLA-B*5801流行病学

高加索人和西班牙人：1/3846， 0.7%
非裔美国人：1/735， 3.8%
亚洲人：1/336， 7.4%
北方人：8.35%，南方人：5.83%

Markov model
Discount 3%
WTP=$109,000 /QALY



Model inputs

| Model estimate | Base-case estimate (range) | Reference |
|---|---|---|
| Prevalence of HLA-B*5801 and test characteristics | | |
| Caucasians and Hispanics | 0.7% (0.4–1.0%) | [14] |
| African Americans | 3.8% (2.0–6.0%) | [14] |
| Asians | 7.4% (4.4–13.0%) | [14] |
| Sensitivity | 0.8417 (0.75–1.00) | [12] |
| Specificity | 0.9538 (0.85–1.00) | [12] |
| Probability and complications of SJS/TEN | | |
| Caucasians and Hispanics | | |
| Probability of SJS/TEN[a] | 0.00026 (0.00013–0.00039) | [4] |
| Risk of SJS/TEN if *HLA-B*5801* positive | 0.00472 (0.00129–1.00) | Calculated |
| Risk of SJS/TEN if *HLA-B*5801* negative | 0.00004 (0.00–0.00008) | Calculated |
| African Americans | | |
| Probability of SJS/TEN[b] | 0.00136 (0.00068–0.00204) | [4,23] |
| Risk of SJS/TEN if *HLA-B*5801* positive | 0.02421 (0.00676–1.00) | Calculated |
| Risk of SJS/TEN if *HLA-B*5801* negative | 0.00022 (0.00–0.00040) | Calculated |
| Asians | | |
| Probability of SJS/TEN[c] | 0.00298 (0.00149–0.00447) | [4,23] |
| Risk of SJS/TEN if *HLA-B*5801* positive | 0.05164 (0.01472–1.00) | Calculated |
| Risk of SJS/TEN if *HLA-B*5801* negative | 0.00050 (0.00–0.00087) | Calculated |
| Probability Death due to SJS/TEN[d] | 0.30 (0.15–0.45) | [4] |
| Probability long-term complications due to SJS/TEN | 0.19 (0.10–0.29) | [7] |
| Utility[e] | | |
| SJS/TEN | 0.35 (0.22–0.48) | [24] |
| Other hospitalized cutaneous adverse reactions | 0.53 (0.27–0.68) | Clinical assumption |
| Long-term complications from SJS/TEN | 0.68 (0.57–0.79) | [25] |
| Costs | | |
| *HLA-B*5801* testing | $129 ($65–$258) | CPT code 81381 |
| SJS/TEN | $45,661 ($22,830–$68,491) | [22] |
| Other hospitalized cutaneous adverse reactions | $6180 ($3090–$9270) | [22] |
| Long-term complications from SJS/TEN[f] | $980 ($945–$1012) | [27] |
| Allopurinol[g] | $72 ($35–$107) | [14] |
| Febuxostat[g] | $2213 ($1111–$3336) | [14] |

# 结果

**Table 2**
Results from the base-case analysis

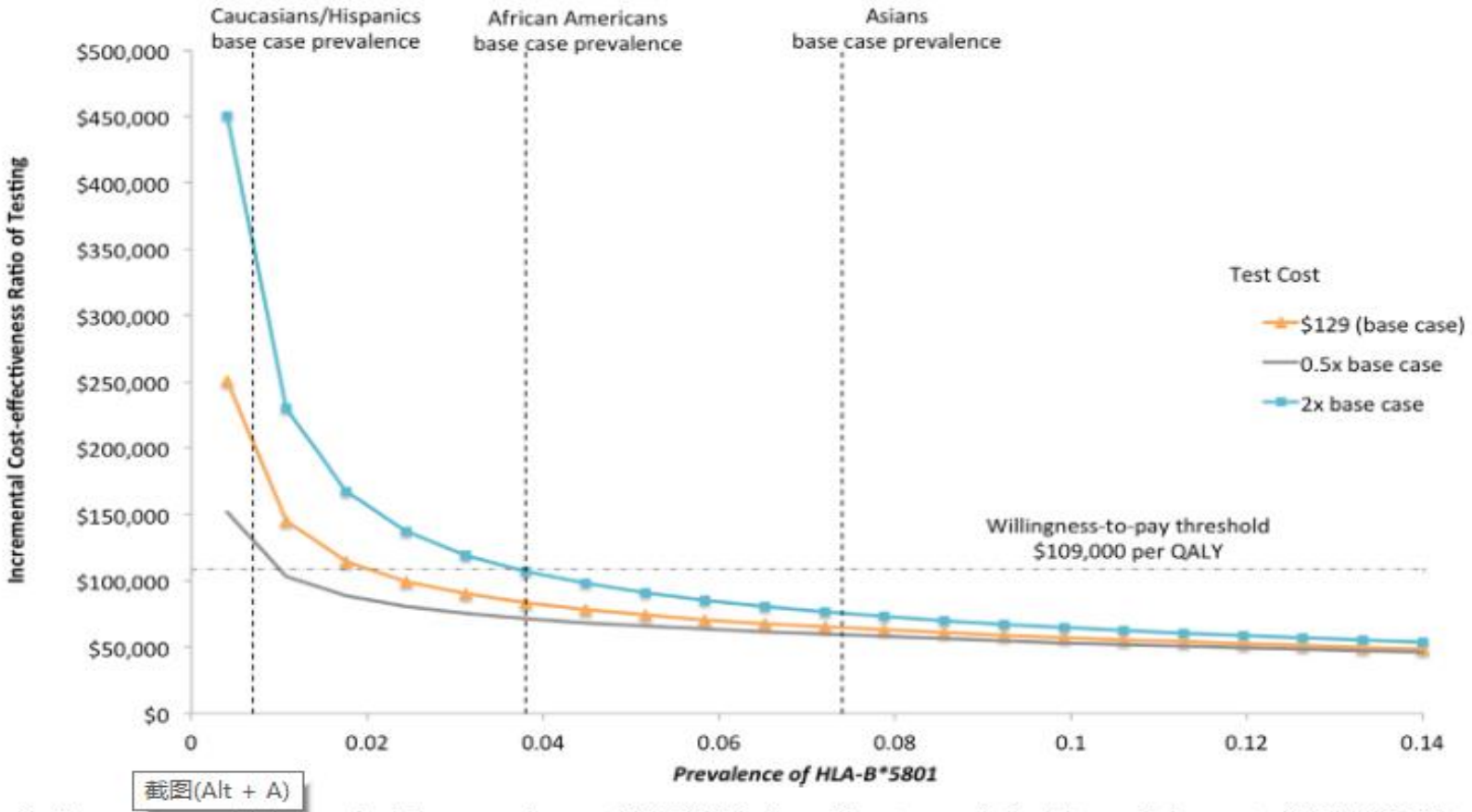
| | Lifetime costs, $ | Incremental costs, $ | QALYs | QALYs gained | ICER, $/*QALY* |
|---|---|---|---|---|---|
| Caucasians and Hispanics (prevalence *HLA-B*5801* 0.007, SJS/TEN risk 0.00026) | | | | | |
| No testing, initiate allopurinol–febuxostat sequential therapy | $23,777 | | 13.2248 | | Reference |
| Universal *HLA-B*5801* testing | $23,966 | $189 | 13.2258 | 0.0010 | $183,720 |
| African Americans (prevalence *HLA-B*5801* 0.038, SJS/TEN risk 0.00136) | | | | | |
| No testing, initiate allopurinol–febuxostat sequential therapy | $23,826 | | 13.2205 | | Reference |
| Universal *HLA-B*5801* testing | $24,280 | $454 | 13.2259 | 0.0054 | $83,450 |
| Asians (prevalence *HLA-B*5801* 0.074, SJS/TEN risk 0.00298) | | | | | |
| No testing, initiate allopurinol–febuxostat sequential therapy | $23,898 | | 13.2141 | | Reference |
| Universal *HLA-B*5801* testing | $24,648 | $750 | 13.2257 | 0.0117 | $64,190 |

Abbreviations: ICER, incremental cost-effectiveness ratio; QALY, quality-adjusted life-year; SJS, Stevens–Johnson syndrome; TEN, toxic epidermal necrolysis.

**Table 3**
One-way sensitivity analysis

| | Caucasians/Hispanics (base case ICER of universal *HLA-B*5801* testing $183,720) | | African Americans (base case ICER of universal *HLA-B*5801* testing $83,450) | | Asians (base case ICER of universal *HLA-B*5801* testing $64,190) | |
|---|---|---|---|---|---|---|
| Test characteristics and probability and complications of SJS/TEN (base-case; low range, high range) | | | | | | |
| Sensitivity (0.8417; 0.74, 1.00) | $201,790 | $158,930 | $91,800 | $71,930 | $70,680 | $55,150 |
| Specificity (0.9538; 0.85, 1.00) | $187,250 | $182,420 | $85,080 | $82,850 | $65,470 | $63,720 |
| Death due to SJS/TEN (0.30; 0.15, 0.45) | $261,170 | $124,030 | $117,470 | $65,040 | $91,310 | $49,840 |
| Probability of SJS/TEN (Caucasians and Hispanics: 0.00026; 0.00013, 0.00039) (African Americans: 0.00136; 0.00068, 0.00204) (Asians: 0.00298; 0.00149, 0.00447) | $298,140 | $131,080 | $137,330 | $57,820 | $109,030 | $43,400 |
| Long-term complications from SJS/TEN (0.19; 0.10, 0.29) | $192,580 | $175,600 | $87,630 | $79,620 | $67,610 | $61,070 |
| Utility (base case; low rang, high range) | | | | | | |
| SJS/TEN (0.35; 0.22, 0.48) | $183,490 | $183,900 | $83,350 | $83,550 | $64,110 | $64,270 |
| Other hospitalized cutaneous adverse reactions (0.53; 0.27, 0.68) | $183,660 | $183,750 | $83,420 | $83,470 | $64,170 | $64,200 |
| Long-term complications from SJS/TEN (0.68; 0.57, 0.79) | $177,950 | $189,870 | $80,850 | $86,220 | $62,130 | $66,390 |
| Cost (base case; low range, high range) | | | | | | |
| SJS/TEN ($45,661; $22,830, $68,491) | $187,400 | $180,030 | $87,100 | $79,800 | $67,970 | $60,410 |
| Other hospitalized cutaneous adverse reactions ($6180; $3090, $9270) | $183,780 | $183,650 | $83,520 | $83,380 | $64,260 | $64,120 |
| Long-term complications SJS/TEN ($980; $945, $1012) | $183,740 | $183,710 | $83,470 | $83,440 | $64,210 | $64,180 |
| Allopurinol ($72; $35, $107) | $184,780 | $182,730 | $84,540 | $82,440 | $65,170 | $63,280 |
| Febuxostat ($2213; $1111, $3336) | $149,880 | $218,350 | $48,780 | $118,930 | $32,800 | $96,320 |

Abbreviations: ICER, incremental cost-effectiveness ratio; SJS, Stevens–Johnson syndrome; TEN, toxic epidermal necrolysis.




截图(Alt + A)

**Fig. 2.** Two-way sensitivity analysis by prevalence of *HLA*5801* According to race/ethnicity and the cost of *HLA-B*5801* test.

# 结　论

- 亚洲和非洲人：　使用别嘌呤醇前检测HLA-B*5801 具有成本-效果。
- 美国人：使用HLA-B*5801别嘌呤醇前检测HLA-B*5801 不具有成本-效果。

# 2.注射用保肝药物比较

## 国内外指南保肝药物推荐

### 国外

美国/日本：N-乙酰半胱氨酸

***Recommendations***

1. In individuals with suspected DILI, especially when liver biochemistries are rising rapidly or there is evidence of liver dysfunction, the suspected agent(s) should be promptly stopped (Strong recommendation, low level of evidence).
2. No definitive therapies are available either for idiosyncratic DILI with or without ALF: however, NAC may be considered in adults with early-stage ALF, given its good safety profile and some evidence for efficacy in early coma stage patients (Conditional recommendation, low level of evidence).
3. NAC is not recommended for children with severe DILI leading to ALF (Strong recommendation, low level of evidence).

### 国内

N-乙酰半胱氨酸

**异甘草酸镁**

复方甘草酸苷

甘草酸二铵

还原型谷胱甘肽

硫普罗宁

水飞蓟素

双环醇

多烯磷脂酰胆碱

熊去氧胆酸

丁二磺酸腺苷蛋氨酸

# 2.注射用保肝药物比较

## 研究对象

回顾性分析 2016年1月-2017年12月在我院住院药物性肝损伤患者。

## 纳入标准

**A组：** 注射用复方甘草酸苷+注射用还原谷胱甘肽
**B组：** 注射用复方甘草酸苷+注射用还原谷胱甘肽+多烯磷脂酰胆碱注射液
**C组:** 注射用复方甘草酸苷+注射用还原谷胱甘肽+多烯磷脂酰胆碱注射液+双环醇片

## 排除标准

1. 合并感染
2. 伴有其他病毒性肝病、酒精性肝病及脂肪肝
3. 行人工肝或者肝移植患者
4. 临床资料不全，影响结果可靠性的病例

## 观察疗程为2周

## 入选病例DILI严重程度分级

| 组别 | 病例总数 | 肝损伤程度 | | | *P* |
|---|---|---|---|---|---|
| | | 轻度肝损伤 | 中度肝损伤 | 重度肝损伤 | |
| A | 45 | 27 | 7 | 11 | 0.925 |
| B | 39 | 22 | 8 | 9 | |
| C | 41 | 28 | 5 | 8 | |

3组患者在肝损伤严重程度比较无统计学差异（$P > 0.05$），具有可比性。

# 有效性判断标准

- 显效: 临床症状消失，血清 ALT， AST 等肝功能指标降至正常；
- 有效：临床症状消失或好转，血清 ALT， AST 等肝功能指标较前明显好转且下降幅度超过原值的 50%以上；
- 无效：未能达到上述标准；
- 总有效率=（显效+有效） /总例数×100%。

## 3组保肝药物联合方案治疗DILI的疗效

| 组别 | n/例数 | 显效/n（%） | 有效/n（%） | 无效/n（%） | 总有效率（%） | P |
|---|---|---|---|---|---|---|
| A组 | 45 | 10 | 31 | 4 | 91.11 | 0.439 |
| B组 | 39 | 7 | 29 | 3 | 92.30 | |
| C组 | 41 | 20 | 20 | 1 | 97.56 | |

**3组患者在肝损伤严重程度比较无统计学差异（*P*> 0.05），具有可比性。**

A组：注射用复方甘草酸苷+注射用还原谷胱甘肽
B组：注射用复方甘草酸苷+注射用还原谷胱甘肽+多烯磷脂酰胆碱注射液
C组: 注射用复方甘草酸苷+注射用还原谷胱甘肽+多烯磷脂酰胆碱注射液+双环醇片

# 最小成本法

| 组别 | 保肝药品总费用 | 溶媒费用 | 输液器费用 | 检验费用 | 总费用 |
|---|---|---|---|---|---|
| A | 876.29±166.16 | 77.31±14.66 | 253.44±48.06 | 656.53±117.97 | 1863.57±282.62 |
| B | 1832.41±335.89 | 152.47±27.95 | 249.91±45.81 | 767.92±180.98 | 3002.70±474.48 |
| C | 2043.47±322.14 | 157.04±24.76 | 257.4±40.58 | 788.61±206.90 | 3246.52±531.70 |
| *P* | <0.05 | <0.05 | >0.05 | <0.05 | <0.05 |

*P*<0.05表示说明3组患者的成本是具有统计学差异。

**注射用复方甘草酸苷+注射用还原型谷胱甘肽（A方案）的总费用最低，为优势方案。**

# 3.华法林和利伐沙班治疗肺栓塞的成本分析

## ——真实世界研究

研究共纳入196例患者，其中华法林组117例，利伐沙班组79例。总体年龄分布在21～92岁，平均年龄61.29岁，其中男性96例，占48.98%。

两组患者的年龄、性别、入院方式、入院血压/心率/血氧饱和度、合并基础病、精神疾病、贫血及血小板减少、恶性肿瘤史、慢性心/肺疾病史、消化性溃疡史及脑血管疾病史等基线资料的差异均无统计学意义（表3）。

# 表3 纳入肺栓塞患者的一般资料

| 基线值 | 华法林（n=117） | 利伐沙班（n=79） | t/$X^2$值 | *P* |
|---|---|---|---|---|
| 年龄（ $\bar{x}\pm s$ ） | 61.45 ± 15.12 | 61.05 ± 15.99 | 0.179 | 0.858 |
| 性别（男/女） | 53/64 | 43/36 | 1.573 | 0.210 |
| 急诊入院，n（百分比） | 89（76.07%） | 62（78.48%） | 0.115 | 0.694 |
| 血压、心率或血氧饱和度异常，n（百分比） | 3（2.56%） | 5（6.33%） | 0.881 | 0.348 |
| 合并高血压，n（百分比） | 59（50.4%） | 32（40.5%） | 1.866 | 0.172 |
| 合并糖尿病，n（百分比） | 23（19.7%） | 9（11.4%） | 2.359 | 0.125 |
| 合并抑郁状态，n（百分比） | 4（3.42%） | 0（0） | 1.312 | 0.252 |
| 合并精神分裂，n（百分比） | 1（0.85%） | 0（0） | 0.000 | 1.000 |
| 合并帕金森疾病，n（百分比） | 0（0） | 1（1.27%） | 0.039 | 0.843 |
| 合并癫痫，n（百分比） | 1（0.85%） | 0（0） | 0.000 | 1.000 |
| 合并痴呆，n（百分比） | 1（0.85%） | 0（0） | 0.000 | 1.000 |
| 合并贫血，n（百分比） | 6（5.13%） | 5（6.33%） | 0.002 | 0.967 |

# 亚组分析

根据sPESI评分，将196例患者分为**155**例低危患者和**41**例高危患者两个亚组。结果显示，无论是低危还是高危患者，利伐沙班组均比华法林组有更短的住院时长（$P$=0.000，$P$=0.000）和更低的住院费用（$P$=0.019，$P$=0.099）。

**图1 整体、sPESI低危和高危患者的住院时长**

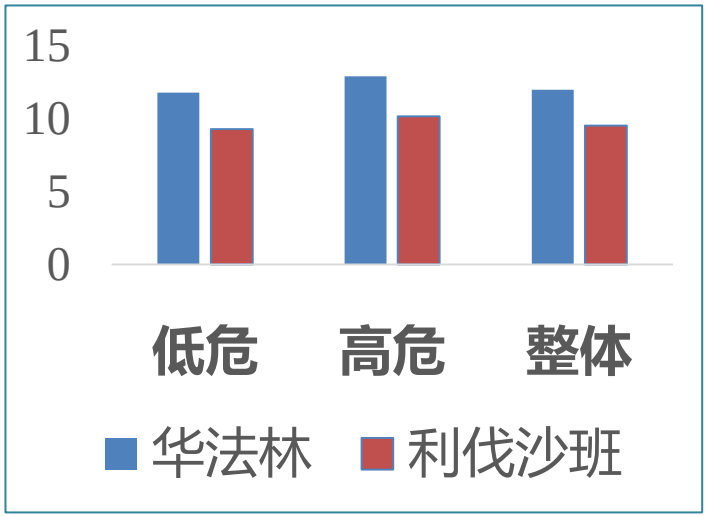
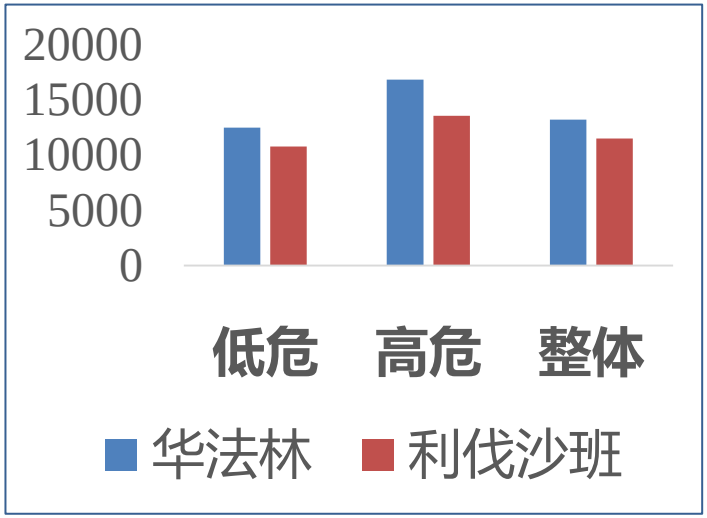



**图2 整体、sPESI低危和高危患者的住院费用**



# 出血率

196名患者中共出现**36**例出血事件，其中严重出血**4**例，轻微出血**32**例。华法林组及利伐沙班组用药90天内出现的总出血事件（20.51%vs15.19%，$P$=0.345），差异无统计学意义。

**表7 总出血事件发生率和严重出血事件发生率**

| | 华法林组，n（百分数） | 利伐沙班组，n（百分数） | $x^2$ | $P$ |
|---|---|---|---|---|
| **总出血事件发生率** | 24（20.51%） | 12（15.19%） | 0.891 | **0.345** |
| **严重出血事件发生率** | 4（3.42%） | 0（0） | 1.312 | 0.252 |

# 再住院率

90天内患者再入院治疗**8**例。华法林组再入院**7**例（5.98%），利伐沙班组再入院**1**例（1.27%），差异无统计学意义。

其中5例患者因咯血、鼻出血、黑便或消化道出血入院，3例患者因咳嗽、气短症状加重再入院。

**再住院率、复发再住院率**

| | 华法林组，n（百分数） | 利伐沙班组，n（百分数） | $x^2$ | $P$ |
|---|---|---|---|---|
| **总再住院率** | 7（5.98%） | 1（1.27%） | 1.611 | 0.204 |
| **复发再住院率** | 3（2.56%） | 0（0） | 0.708 | 0.400 |

# 住院时长、住院费用及抗凝药费

经协变量调整后，利伐沙班组的住院时长显著缩短2.45天，住院费用显著降低1707.45元。

**表4 纳入肺栓塞（PTE）患者的住院时长与住院费用**

| | 华法林组 Mean ± SD | 利伐沙班组 Mean ± SD | 调整平均差（95% CI） | *P* |
|---|---|---|---|---|
| **住院时长** | 11.96 ± 4.23 | **9.51 ± 3.34*** | **2.45** (1.39, 3.51) | **0.000** |
| **住院费用** | 13196.24 ± 5218.58 | **11488.79* ±5646.75** | **1707.45** (323.63, 3091.28) | **0.031** |

# 二、慢病管理效果及经济学评价

1. 药物重整经济学
2. 糖尿病管理成效
3. 糖尿病合并高血压成本-效果分析

# Value of the Pharmacist in the Medication Reconciliation Process

Jennifer Splawski, PharmD, BCPS; and Heather Minger, PharmD, BCPS

**Keywords:** medication reconciliation, pharmacist, health plans, physicians, nurses, P&T committees, hospitals, litigation, competency, standards of care

## INTRODUCTION

Medication reconciliation has increased in importance since the passage of the Patient Protection and Affordable Care Act in 2010. Because of the ripple effects that occur when medication-related issues reduce quality of care while causing the U.S. health system to pay more avoidable costs at a time of risk-sharing arrangements or decreasing revenues for most organizations, medication reconciliation has become a higher priority.

Medication reconciliation has been available since 2005, but its adoption has

pitals, the Joint Commission (JC) includes medication errors of omission, contraindications, and duplication as well as errors involving drug–drug and drug–disease interactions.[2] One of the JC's National Patient Safety Goals, NPSG.03.06.01, is to "record and pass along correct information about a patient's medicines" and review safe practices for medication reconciliation. In addition to reconciliation, patients should be educated on using medication safely and communicating medication information to their care providers.

Under various risk-sharing arrangements, the financial health of providers, hospitals, and to an extent health plans is tied to quality outcomes and performance metrics. For health care systems today, not only is reimbursement at risk but

their competence, help develop information systems for data extraction regarding medication reconciliation activities, and advocate medication reconciliation services to providers, nurses, and the community.

## IMPROVED ACCURACY

Fewer errors are found when a pharmacist, rather than a physician, completes a patient's medication reconciliation. Fifty-five patients were included in an evaluation comparing physician-obtained medication histories to pharmacist-obtained medication histories. Pharmacists in this study identified 353 discrepancies, 58 of which had not been found by physicians.[4] Another study focused on the emergency department, where the intervention of pharmacists reduced overall medication reconcili-

**Table 2 Summary of National Transitions of Care Coalition Strategies to Improve Care Transitions[12]**

1. Assess the safe use of medication management by the patient and the family.
2. Ensure a formal process is in place for the safe transition of patients.
3. Actively engage the patient and his or her family in the decision-making process through education and counseling.
4. Transfer and share important information in a timely manner between the patient and other health care providers.
5. Facilitate follow-up care of the patient.
6. The health care provider must be actively engaged in the ownership of the health care of the patient.
7. Accountability for the care of the patient is shared between both the transitioning provider and the receiving provider.

# 药师减少患者死亡率

| Table 1 Pharmacist Contribution to Decreased Mortality When Completing Medication Admission Histories[8,a] | |
|---|---|
| Annual number of admissions per hospital with pharmacist-provided admission drug histories (mean ± standard deviation [SD]) | 11,239 ± 4,462 |
| Annual number of deaths per 1,000 admissions at a hospital with pharmacist-provided admission drug histories (mean ± SD) | 38.29 ± 19.67 |
| Annual number of deaths per 1,000 admissions at a hospital without pharmacist-provided admission drug histories (mean ± SD) | 47.88 ± 40.18 |
| Reduction in the number of deaths[b] | 3,988 |
| Reduction in the number of deaths per hospital (mean ± SD) | 107.78 ± 87.6 (20.2%) |

[a] Researchers compiled data from 2,836,991 patients in 885 hospitals. Data from hospitals that had 14 clinical pharmacy services were compared with data from hospitals that did not have these services.

[b] Difference in death rates multiplied by number of admissions per year multiplied by number of hospitals.

- Providing leadership in designir and managing patient-centered medication reconciliation systems
- Educating patients and health ca professionals about the benefi ts a limitations of the medication reco ciliation process.
- Serving as patient advocates throughout transitions of care.

**Table 3 Medication Reconciliation Positions of Key Organizations**

| Organization | Rationale | Recommendation | Goal |
|---|---|---|---|
| The Joint Commission[2] | Many patients take large amounts of medication involving complex regimens. Managing these medications is an important safety issue. | National Patient Safety Goal 03.06.01: document and pass along information about patients' medications; review safe practices for medication reconciliation. | Reduce negative outcomes associated with medication discrepancies. |
| Centers for Medicare and Medicaid Services[16] | The eligible professional (EP) who receives a patient from another setting or provider of care or believes an encounter is relevant should perform medication reconciliation. | The EP performs medication reconciliation for more than 50% of transitions of care in which the patient is transitioned into the EP's care. | Achieve meaningful use stage 2 core measure for electronic health records. |
| Agency for Healthcare Research and Quality[17] | Adverse medication events in the elderly are an important avenue for quality improvement due to the potential number of such events. | Assess the percentage of discharges with medication reconciliation from January 1 to December 1 of the measurement year for members 66 years of age and older in Medicare Special Needs Plans. | Effective communication and care coordination, prevention and treatment of leading causes of mortality, and safer care. |
| Institute for Healthcare Improvement[18] | Poor communication of medical information at transition points is responsible for as many as 50% of all medication errors and up to 20% of adverse drug events in the hospital. | Reconcile medications at admission, transfer, discharge, and in outpatient settings. | Decrease medication errors and harm. |
| Department of Veterans Affairs (VA)[19] | Accurate medication information impacts the care of veterans. | Systemwide approach to managing patient medication information by reconciling medications across the continuum of care. | Local VA facilities to create policies; leaders to ensure appropriate medication reconciliation at all transitions of care in the VA and with outside providers. |

# 2. 糖 尿 病

- 药师干预组与未干预组比较

  前瞻性、多中心、随机对照临床研究（1年9次）

  依从性、糖尿病知识水平、HbA1c水平

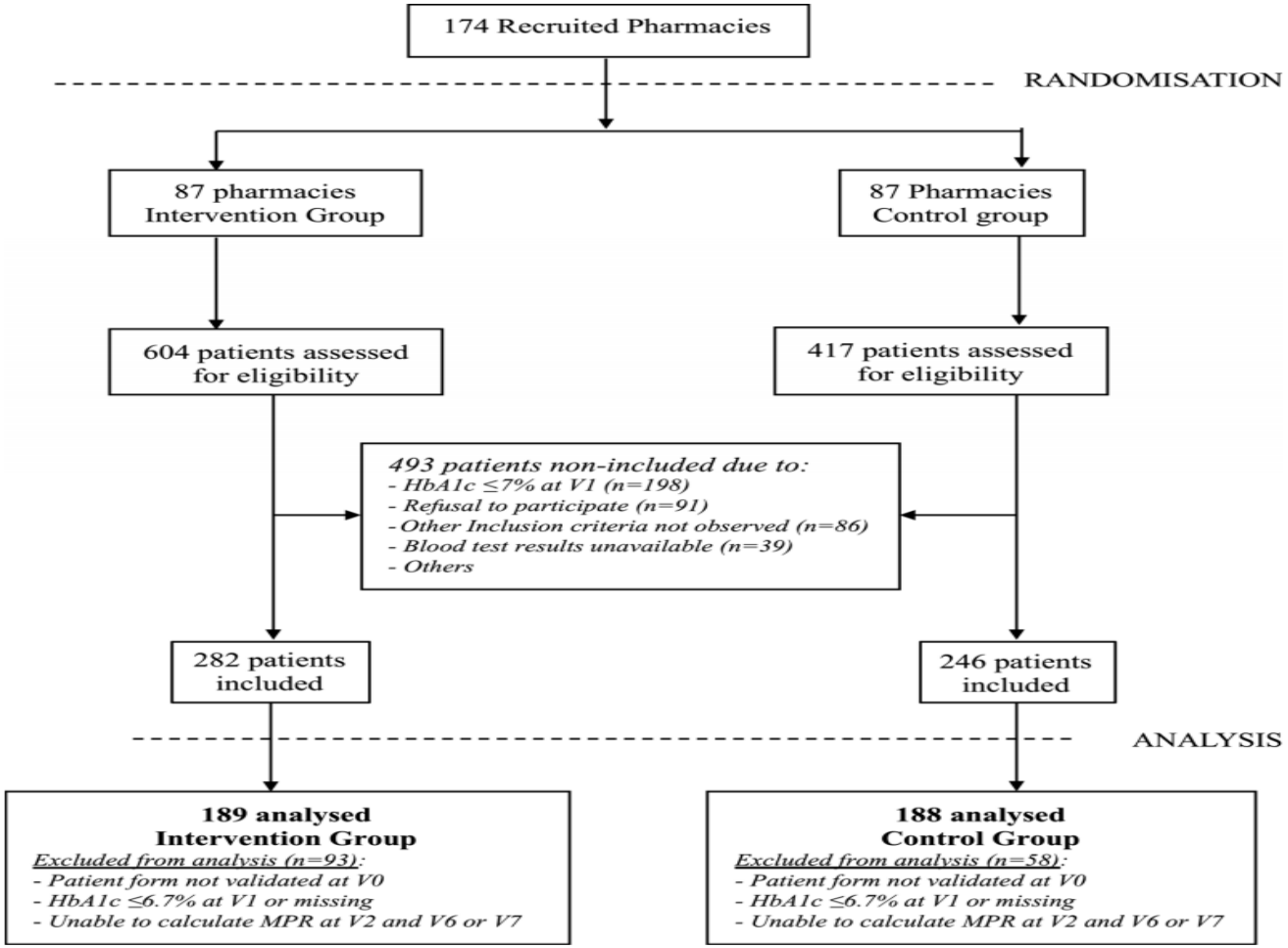



**Fig. 1** Flow diagram of study participants: pharmacies and patients

**纳入标准：**

HbA1c>7%

≤3种口服药

接受服务>6个月

**排除标准：**

HbA1c>7%

恶性肿瘤

胰岛素或注射用降糖药

参与其他的治疗教育项目

# 依从性MPR

- 以药物持有率(Medication Possession Ratio,MPR)量化患者在随访期内的药物依从性。
- MPR=实际服用药物总量/应该服用药物总量
- MPR>80%, 表示依从性高。

**Table 2** Parameters of diabetes control

| | Intervention group | Control group | *p* value |
|---|---|---|---|
| HbA1c % (m | *n* = 160 | *n* = 162 | |
| Baseline | 7.9 ± 1.1 | 7.7 ± 0.8 | 0.11[c] |
| 6 months | 7.4 ± 1.0**** | 7.5 ± 0.8*** | 0.212[c] |
| 12 months | 7.3 ± 0.9**** | 7.6 ± 1.0** | 0.067[c] |
| Patients with | | | |
| Baseline | 4/188 (2.1) | 0/189 (0) | 0.1230[a] |
| 6 months | 57/160 (35.6) | 32/163 (19.6) | 0.0013[b] |
| LDL-c mg/dl (mean ± SD) | *n* = 78 | *n* = 74 | |
| Baseline | 110 ± 40 | 120 ± 60 | 0.0840[c] |
| 6 months | 100 ± 30 | 120 ± 50 | 0.0306[c] |
| 12 months | 110 ± 40 | 110 ± 50 | 0.3665[c] |
| Systolic blood pressure, mmHg (mean ± SD) | *n* = 119 | *n* = 115 | |
| Baseline | 134.4 ± 11.6 | 137.0 ± 11.6 | 0.0884[c] |
| 6 months | 133.7 ± 10.1 | 136.8 ± 9.6 | 0.0160[c] |
| 12 months | 134.9 ± 10 | 136.9 ± 9.8 | 0.1378[c] |
| Diastolic blood pressure, mmHg (mean ± SD) | *n* = 118 | *n* = 113 | |
| Baseline | 78.5 ± 8.7 | 79.9 ± 8.2 | 0.2124[c] |
| 6 months | 78.7 ± 8.4 | 81.1 ± 9.5 | 0.0405[c] |
| 12 months | 79.8 ± 8.3 | 79.9 ± 7.8 | 0.9315[c] |

Within-group comparisons versus baseline performed using the Student's paired test: $^{**}p < 0.01$, $^{***}p < 0.001$, $^{****}p < 0.0001$

HbA1c<7%
LDL-C
收缩压
舒张压

# 糖尿病治疗自我处理能力

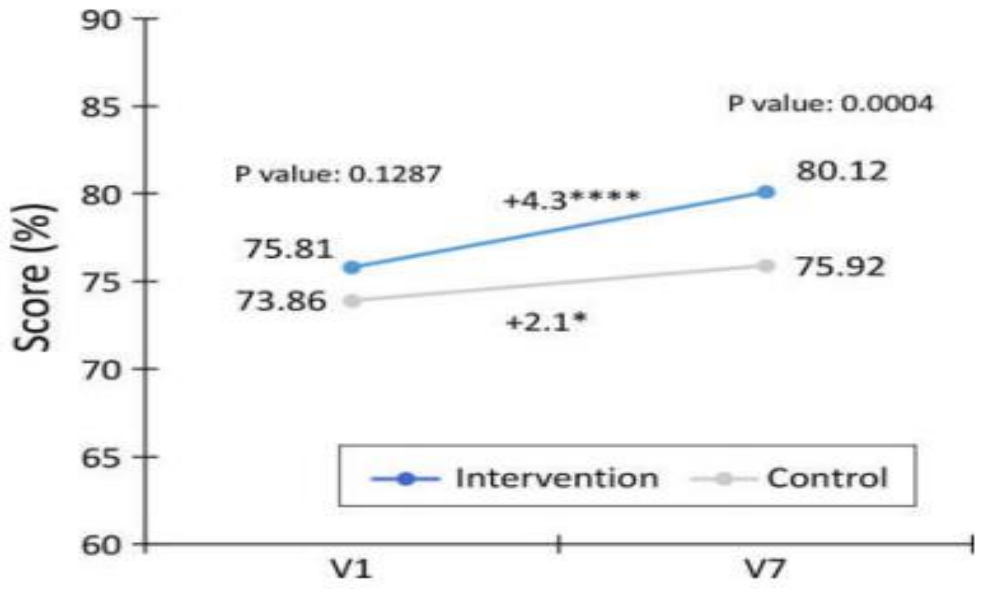



**Fig. 2** Change in global TOP scores (%) from baseline (V1) to 6 months (V7) in the intervention and control groups. Within-group comparisons using Student's paired *t*-test: $^{*}p < 0.05$; $^{****}p < 0.0001$. Between-group comparisons using the ANOVA Fisher-Snedecor ($p$ value)


difference between the two groups. Significant decreases in HbA1c were observed in both groups at 6 months ($p < 0.001$) and 12 months ($p < 0.01$), with significantly greater changes from baseline in the intervention group than in the control group at 6 months (– 0.5% vs. – 0.2%, $p = 0.0047$) and 12 months (– 0.6% vs. – 0.2%, $p = 0.0057$). Patients in the intervention group showed greater improvement in their ability to self-manage treatment (+ 4.86 vs. + 1.58, $p = 0.0014$) and in the extent of their knowledge about diabetes (+ 0.6 vs. + 0.2, $p < 0.01$) at 6 months versus baseline compared with the control group.

***Conclusion***: Tailored information provided by the pharmacist to patients with type 2 diabetes did not significantly improve the already high adherence rates, but was associated with a significant decrease in HbA1c and an improvement of patient knowledge about diabetes.

***Trial Registration***: ISRCTN33776525.

***Funding***: MSD France.

# 疾病认知度得分

**Table 3** Disease knowledge acquisition results

| Number of correct answers (mean ± SD) | Intervention group | Control group | *p* value[a] |
|---|---|---|---|
| Baseline | 8.3 ± 1.3 | 7.9 ± 1.3 | 0.0770 |
| 6 months ($n$ = 139) | 8.9 ± 1.0 | 8.2 ± 1.2 | 0.0002 |
| Difference from baseline, % (95% CI) | 0.6 ± 1.4 (0.3–1.0) | 0.3 ± 1.5 (0.07–0.7) | 0.2074 |
| 12 months ($n$ = 132) | 8.8 ± 1.2 | 8.0 ± 1.3 | 0.0003 |
| Difference from baseline, % (95% CI) | 0.7 ± 1.5 (0.3–1.0) | 0.2 ± 1.5 (− 0.20 to 0.6) | 0.0976 |

[a] Between-group comparisons of means: analysis of variance (ANOVA Fisher-Snedecor)

# 结果和结论

MPR在干预组和对照组都很高：94.8% vs 92.3%

HbA1c在两组都显著下降：

6个月：—0.5% vs -0.2% P=0.0047

12个月：—0.6% vs —0.2% P=0.0057

自我管理能力改善（+4.86 vs +1.58 P=0.0014)

糖尿病知识（+0.6 vs +0.2 P=0.01)

# 3. 糖尿病合并高血压心血管风险

Pharm World Sci (2007) 29:541–545
DOI 10.1007/s11096-007-9101-7

RESEARCH ARTICLE

## The cost-effectiveness of pharmacist-led treatment of cardiac risk in patients with type 2 diabetes

**Andrew Lowey · Sara Moore · Catherine Norris · David Wright · Jonathan Silcock · Peter Hammond**

*Method*: A pharmacist-led hospital clinic was established to manage diabetic patients suffering from resistant hypertension with or without hyperlipidaemia. Patients with two consecutive elevated blood pressure (BP) readings (>140/80 mmHg) were recruited via referral from out-patient clinics and diabetic nurse specialists. A range of clinical indicators were assessed on referral. The pharmacist prepared individualised patient information and a patient-held record card. An evidence-based algorithm was used to make adjustments (every 4 weeks) to anti-hypertensive

diovascular health of patients with type 2 diabetes.

**Keywords** Diabetes mellitus · Hypertension · Hyperlipidaemia · Pharmacy · Cost-effectiveness · Cardiovascular risk · United Kingdom · Pharmacoeconomics · Pharmacist

**Introduction**

# 糖尿病合并高血压心血管风险

纳入标准：糖尿>>病合并难治性高血压（>140/80mmHg）

干预措施: 药师主导的糖尿病门诊

效果指标：血压、血脂、10年心血管风险

# 6个月干预效果

**Table 1** Effect of intensive treatment at 6 months (or most recent appointment)

| | Mean results (95% confidence intervals) $n = 53$ | | Paired *t*-test (*P*-value) |
|---|---|---|---|
| | Baseline | Test | |
| Systolic BP (mmHg) | 166 (159–172) | 151 (142–159) | <0.001 |
| Diastolic BP (mmHg) | 91 (88–94) | 84 (81–86) | <0.001 |
| Total cholesterol (mmol/l) | 5.0 (4.7–5.4) | 4.3 (4.1–4.6) | <0.001 |
| Triglyceride (mmol/l) | 3.4 (2.8–4.0) | 3.1 (2.5–3.8) | 0.176 |
| LDL-cholesterol (mmol/l) | 2.6 (2.3–2.9) | 2.0 (1.8–2.2) | <0.001 |
| HDL-cholesterol (mmol/l) | 1.1 (1.0–1.2) | 1.1 (1.0–1.2) | 0.355 |
| CHD risk over 10 years (%) | 32.0 (27.4–36.6) | 28.2 (24.3–32.1) | <0.001 |
| CVA risk over 10 years (%) | 21.8 (17.0–26.6) | 19.7 (15.2–24.2) | <0.001 |
| Anti-hypertensive acquisition costs (£/month) | 26.8 (21.4–32.2) | 33.4 (27.9–38.8) | 0.004 |
| Statin acquisition costs (£/month) | 5.9 (3.2–8.6) | 11.9 (8.6–15.2) | <0.001 |

# 净效益

**Table 3** Cost-effectiveness of service in pounds sterling (euros) 2002 prices

| Benefit description | NNT | Cost per person £ (euros) | Cost per event avoided £ (euros) |
|---|---|---|---|
| CHD risk reduction | 27.9 | 1,244 (1944) | 34,708 (54,231) |
| CVA risk reduction | 50.9 | 1,244 (1944) | 63,320 (98,938) |

# 三、抗凝药学服务经济学评价

## 台湾地区药师参与华法林监测项目

## 成本效果分析

# 1.台湾药师参与华法林抗凝监测项目的成本-效果分析

ISQua®

*International Journal for Quality in Health Care*, 2017, 29(6), 817–825
doi: 10.1093/intqhc/mzx109
Advance Access Publication Date: 22 August 2017
Article

Article

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

JEN-YU CHANG[1,†], CHI-CHUAN WANG[2,3,†], HAO-CHENG KANG[2], LI-JIUAN SHEN[1,2,3], and CHIH-FEN HUANG[2,3]

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[†]These authors contributed equally to this study as the first authors.

Editorial Decision 27 July 2017; Accepted 31 July 2017

**Abstract**

**Objective:** To investigate the cost-effectiveness of the first patient self-paying pharmacist-assisted warfarin monitoring (PAWM) program in Taiwan.
**Design:** A Markov model with a 1-month cycle length and a 20-year time horizon was employed in this study. The model is composed of the following eight states: three no-event states (i.e. 'sub-therapeutic,' 'within therapeutic' and 'supratherapeutic' states), two serious adverse events (AEs) (i.e. bleeding and thromboembolism), two sequelae states and death. The likelihood of events,

地点：药师主导抗凝门诊

受试者：假设的10000名参与者

干预：药师辅助华法林监测和常规医疗

主要结局指标：平均质量调整生命年（QALYs）、每名患者的成本增量、增量成本效益比（ICER）。

结果：PAWM项目使每名患者平均增加0.13 QALYs、成本增加53850台币（1683美元）。由于ICER 410749台币（12836美元）小于人均国内生产总值631142台币（美元19723），PAWM被认为是有成本效果的。敏感性分析表明，我们的结果是稳定的，PAWM项目有86%的概率是有很大成本效果的。

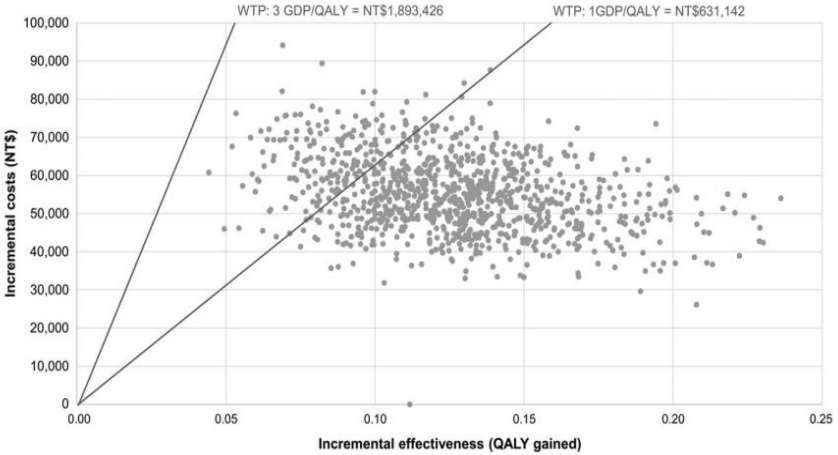
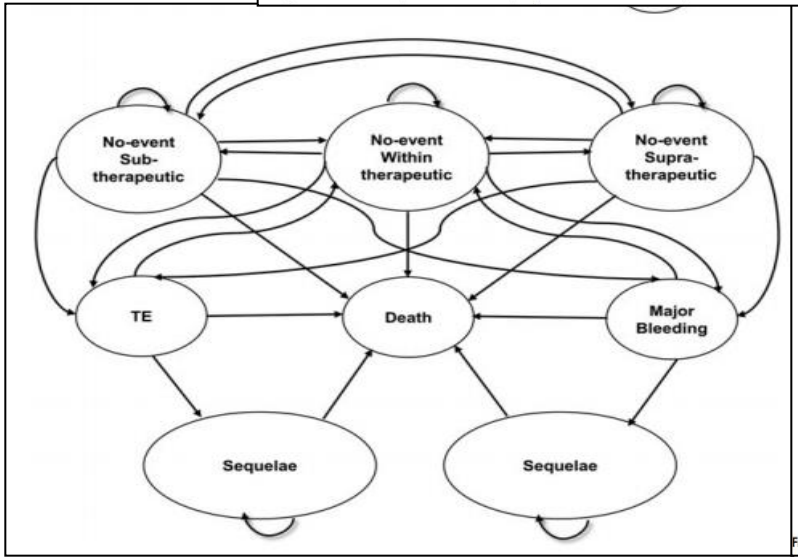



**Figure 3** ICER scatter plot of the PAWM program vs. UC. Each dot represented the result of an MCS. 1000 times of MCS were tested.



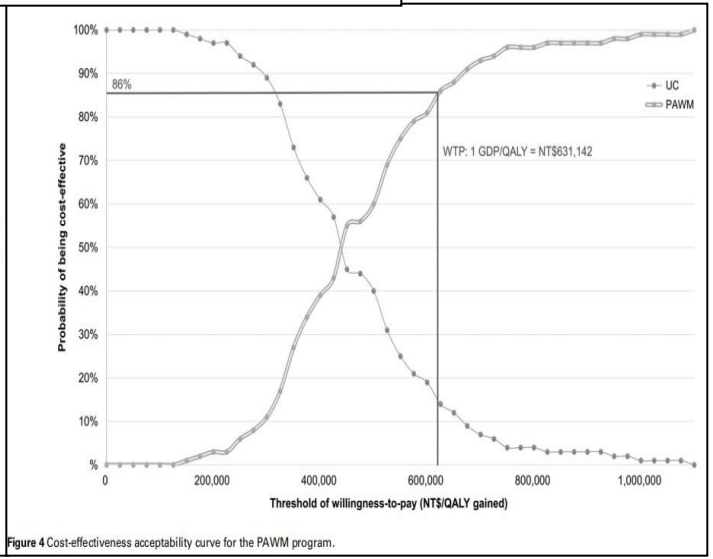




**Figure 4** Cost-effectiveness acceptability curve for the PAWM program.

# Results of the cost-effectiveness analyses: base-case analysis and scenario sensitivity analyses

**Table 2** Results of the cost-effectiveness analyses: base-case analysis and scenario sensitivity analyses

| | Average LYs per person | | Average QALYs per person | | Average costs per person (NT$; 2012 values) | | ICER; costs per LY saved (NT$; 2012 values) | ICER; costs per QALY gained (NT$; 2012 values) |
|---|---|---|---|---|---|---|---|---|
| | Total | Incremental | Total | Incremental | Total | Incremental | | |
| Base-case analysis | | | | | | | | |
| UC | 14.33 | – | 14.03 | – | 85 273 | – | – | – |
| PAWM | 14.45 | 0.11 | 14.17 | 0.12 | 138 340 | 54 609 | 508 440 | 439 434 |
| Scenario sensitivity analysis: all patients started in subtherapeutic no-event state | | | | | | | | |
| UC | 14.32 | – | 14.03 | – | 85 705 | – | – | – |
| PAWM | 14.44 | 0.11 | 14.16 | 0.13 | 139 336 | 53 630 | 472 471 | 403 854 |
| Scenario sensitivity analysis: patients distributed evenly in each no-event state while entering the cohort | | | | | | | | |
| UC | 14.33 | – | 14.03 | – | 84 867 | – | – | – |
| PAWM | 14.44 | 0.11 | 14.16 | 0.13 | 138 957 | 54 089 | 478 302 | 414 029 |

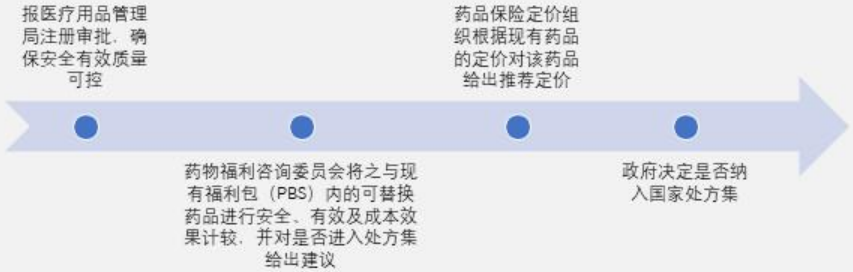
In conclusion, our findings provide the evidence on the cost-effectiveness of the PAWM program, and policymakers should consider reimbursing such a service.

# 各国药物经济学指南

根据ISPOR统计，目前已有40个国家或地区发布了指南，其中“官方指南”22部，“公开出版的推荐性指南”10部，作为规范企业“申请审评的递交资料指南”8部。

| | OECD国家/地区 | 非OECD国家/地区 |
|---|---|---|
| 公开出版的推荐性指南 | 美国、奥地利、单买、匈牙利、意大利、西班牙 | 南非、中国、俄罗斯、克罗地亚 |
| 官方指南 | 墨西哥、加拿大、比利时、法国、韩国、德国、爱尔兰、荷兰、挪威、葡萄牙、斯洛伐克、瑞典、新西兰、斯洛文尼亚、瑞士 | 巴西、古巴、中国台湾、波罗的海三国、埃及、哥伦比亚、马来西亚 |
| 申请审评的递交资料指南 | 以色列、英格兰和威尔士、苏格兰、芬兰、波兰、澳大利亚、西班牙加泰罗尼亚地区 | 泰国 |

## PE指南在药品报销评审及定价中的应用（澳大利亚）




企业药品欲进入PBS，需与政府进行价格协商
若价格高于政府规定的报销价格，需提交PE报告，证明成本效果优势
此外，企业欲更改药品价格和适应症，也需要提交PE报告

《2016年国家基本医疗保险、工伤保险和剩余保险药品目录调整工作方案（征求意见稿）》、《国务院办公厅关于完善公立医院药品集中采购工作的指导意见》、《关于印发国家基本药物目录管理办法的通知》等政策文件中提到需要提供相关药物经济学证据，但目前尚无落地政策将其与卫生决策挂钩

## 目前我国开展成本效用分析的主要局限

- 缺乏疾病人群生命质量的基础数据
- 可以进行效用值转化的生命质量量表有限
- 缺乏基于中国各个地区人群的阈值研究
- 相对于生命质量，决策者和临床医生更认同客观医学指标

*国际药物经济学与结果研究协会（ISPOR，International Social for Pharmacoeconomics and Outcomes Research）*
*经济合作发发展组织（OECD，Organization for Economics Co-operation and Development）*

# 中国药物经济学评价指南及导读


- 指南1：研究问题
- 指南2：研究设计
- 指南3：成本
- 指南4：健康产出
- 指南5：评价方法
- 指南6：模型分析
- 指南7：差异性和不确定性
- 指南8：公平性
- 指南9：外推性
- 指南10：预算影响分析

https://www.ispor.org/PEguidelines/index.asp

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# 《药师法》于2016年正式列为立法项目

- 我国一直存在卫生系统药师和执业药师两种药师体系。


2013：着手启动《药师法》立法调研工作

2016：作为保障和改善民生，加强和创新社会治理的立法项目，由卫生计生委（现国家卫生健康委员会）负责起草

2017.1：正式启动立法工作

2017.5：《中华人民共和国药师法》（草案征求意见稿）发布

2019：……

Thank you!