



國立成功大學醫學院附設醫院
National Cheng Kung University Hospital
生命·愛心·卓越·創新

運用 MediSpan 臨床決策輔助系統 於臨床藥事服務

成大醫院藥劑部 黃千惠組長

2024.11.16



Clinical decision support system (CDSS)

“ As digital tools designed to assist healthcare professionals in clinical decision-making by providing clinical knowledge & patient-specific information. ”

Patient safety



Reduce medication / prescribing errors and prevent adverse events.

Clinical management



Adherence to clinical guidelines, follow-up and treatment reminders.

Automation



Continuous update documentation, and automating tedious steps to reduce workload.

→ **Improve patient outcomes**

成大醫院商用藥品資訊系統引進歷程



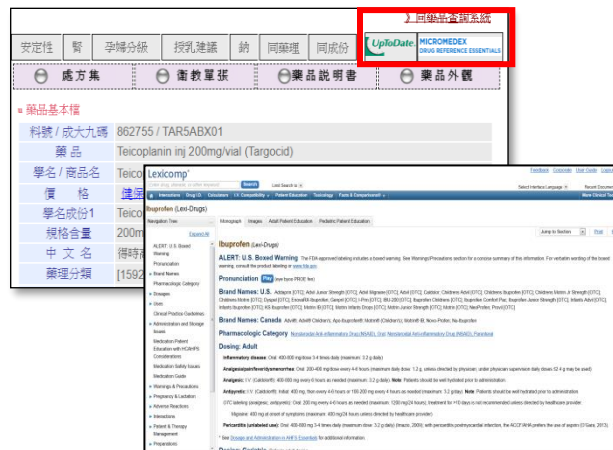
電子資料庫

- 透過網頁或手機APP查詢藥品資料

MICROMEDEX

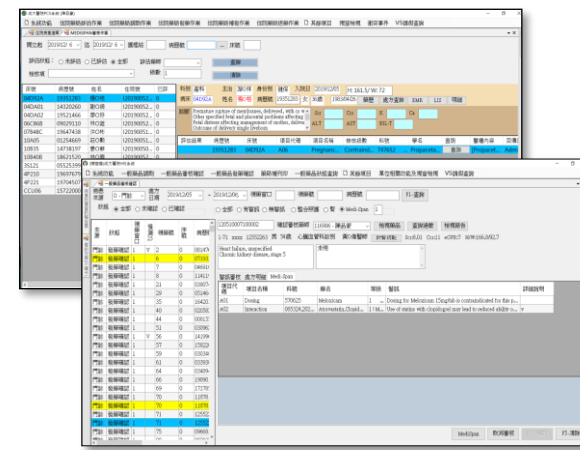
Wolters Kluwer

UpToDate®



整合式查詢

- 將電子資料庫連結嵌入院內網頁或EMR，縮短查詢所需時間。



臨床決策輔助

- 將電子資料庫內容植入EMR，供系統檢核使用

Wolters Kluwer Health

Medi-Span®



Medi-span 臨床解決方案

Drug information solutions

◆ 效益：

- 增加醫療人員對用藥敏感度、優化藥物治療、減少疑義處方



完整資料庫

Lexicomp® UpToDate®



更新速度快

實證醫學藥物資訊 Evidence-based,
peer-reviewed drug information-recommended within workflow.



系統一致性



Medi-Span Clinical: 警示顯示的不同方式

B: 06/May/1969 Gender: Male Height: 177cm Creatinine clearance: 100mL
 e: 50 y.o. Ethnicity: Caucasian Weight: 70kg

Orders

flu

- Fluconazole Cap 200 MG
- Flucytosine Cap 250 MG
- Fluoxetine HCl Cap 10 MG
- Fluoxymesterone Tab 5 MG

SMART VIEWS: ICONS

Displays an interaction or warning, designed by the institution, and indicates type of alert and severity

即時篩選

Remove drug

Drug-Drug Major Alert Monograph

Do not administer **Fluoxetine HCl Cap 10 MG** or **Phenelzine Sulfate Tab 15 MG** within 14 days of one another. Serotonin syndrome may result from concurrent administration. Wait 5 weeks after stopping **Fluoxetine HCl Cap 10 MG** before starting **Phenelzine Sulfate Tab 15 MG**.

Drug-Drug Major Alert Monograph

The risk of bleeding with anticoagulants may be potentiated with concomitant use of **Fluoxetine HCl Cap 10 MG** and patients are at an increased risk of bleeding.

SHORT MESSAGE

A short message that describes the current interaction or adverse effect, depending on alert severity and rules set by the institution

彈性調控訊息

Phenelzine Sulfate Tab 15 MG and Fluoxetine HCl Cap 10 MG

Management Level	Severity Level	Discussion Level	Labelled Assistance Level	Class	Published Information Link
PROFESSIONAL INTERVENTION REQUIRED	MAJOR	Essential	LOW PRIORITY	Alert	Alert Center for Education and Research in Therapeutics Data Library
Professional Intervention Not	Minor	POSSIBLE	None	BLAZE	Medical Products in the EPIC® Alert
		Suspicious	Not specified		Medical Products in the EPIC® Alert and Development Office of the National Coordinator
		Probable			PHARMACY QUALITY ASSURANCE
		Established/Unknown			Not specified

Alert

Do not administer Fluoxetine HCl Cap 10 MG or Phenelzine Sulfate Tab 15 MG within 14 days of one another. Serotonin syndrome may result from concurrent administration. Wait 5 weeks after stopping FLUOXETINE before starting PHENELZINE SULFATE TABLETS.

Effect

Use of Fluoxetine HCl Cap 10 MG with Phenelzine Sulfate Tab 15 MG within 14 days of each other may increase the risk of serotonin syndrome. Wait 5 weeks after stopping FLUOXETINE before starting PHENELZINE SULFATE TABLETS.

Mechanism

Fluoxetine HCl Cap 10 MG and Phenelzine Sulfate Tab 15 MG increase central nervous system serotonin activity, perhaps synergistically.

Management

Avoid this drug combination. Allow at least 14 days when replacing Phenelzine Sulfate Tab 15 MG with Fluoxetine HCl Cap 10 MG or vice versa; allow 5 weeks when replacing Fluoxetine HCl Cap 10 MG with any Phenelzine Sulfate Tab 15 MG.

Discussion

Multiple reports have indicated that concurrent use of a monoamine oxidase inhibitor (MAOI) with a selective serotonin reuptake inhibitor (SSRI), or starting an MAOI or SSRI within days of stopping the other, may precipitate symptoms consistent with serotonin syndrome (SS) [1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17].

A 31-year-old woman began tricyclic antidepressant (TCA) 2 days after Fluoxetine was stopped [1]. Four days later, uncontrollable shivering, nausea, anxiety, and confusion developed 3 hours after her first 20 mg dose. She recovered within a day of stopping tricyclic antidepressant. Another female developed muscle contractions, headache, flushing, and hyperreflexia when tricyclic antidepressant, amitriptyline, and tryptophan were administered within one day of stopping Fluoxetine [2]. Discontinued intravenous digoxin and death resulted. Similar symptoms occurred in 12 patients receiving Fluoxetine with tricyclic antidepressant or phenelzine, and 6 who had an MAOI started 10 or more days after stopping Fluoxetine [3]. Fever, chills, confusion and loss of coordination occurred in a 20-year-old woman despite a 6-week interval between stopping Fluoxetine and starting tricyclic antidepressant [4]. Similar adverse effects have been reported in patients receiving sertraline with tricyclic antidepressant [5] and nortriptyline [6, 7] and paroxetine [8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20, 21, 22, 23, 24, 25, 26, 27, 28, 29, 30, 31, 32, 33, 34, 35, 36, 37, 38, 39, 40, 41, 42, 43, 44, 45, 46, 47, 48, 49, 50, 51, 52, 53, 54, 55, 56, 57, 58, 59, 60, 61, 62, 63, 64, 65, 66, 67, 68, 69, 70, 71, 72, 73, 74, 75, 76, 77, 78, 79, 80, 81, 82, 83, 84, 85, 86, 87, 88, 89, 90, 91, 92, 93, 94, 95, 96, 97, 98, 99, 100]. Similar reactions have been reported with citalopram [35, 36], although co-administration of very small amounts of an MAOI and Fluoxetine was considered safe in 2 cases, there remains a substantial risk for mortality [6]. In healthy volunteers, risperidone (up to 400 mg/day) with Fluoxetine 20 mg/day did not produce SS [3].

ALERT MONOGRAPH

Displays interaction effects, mechanism, management, and discussion based on the latest evidence, providing real-time guidance

指引實證訊息



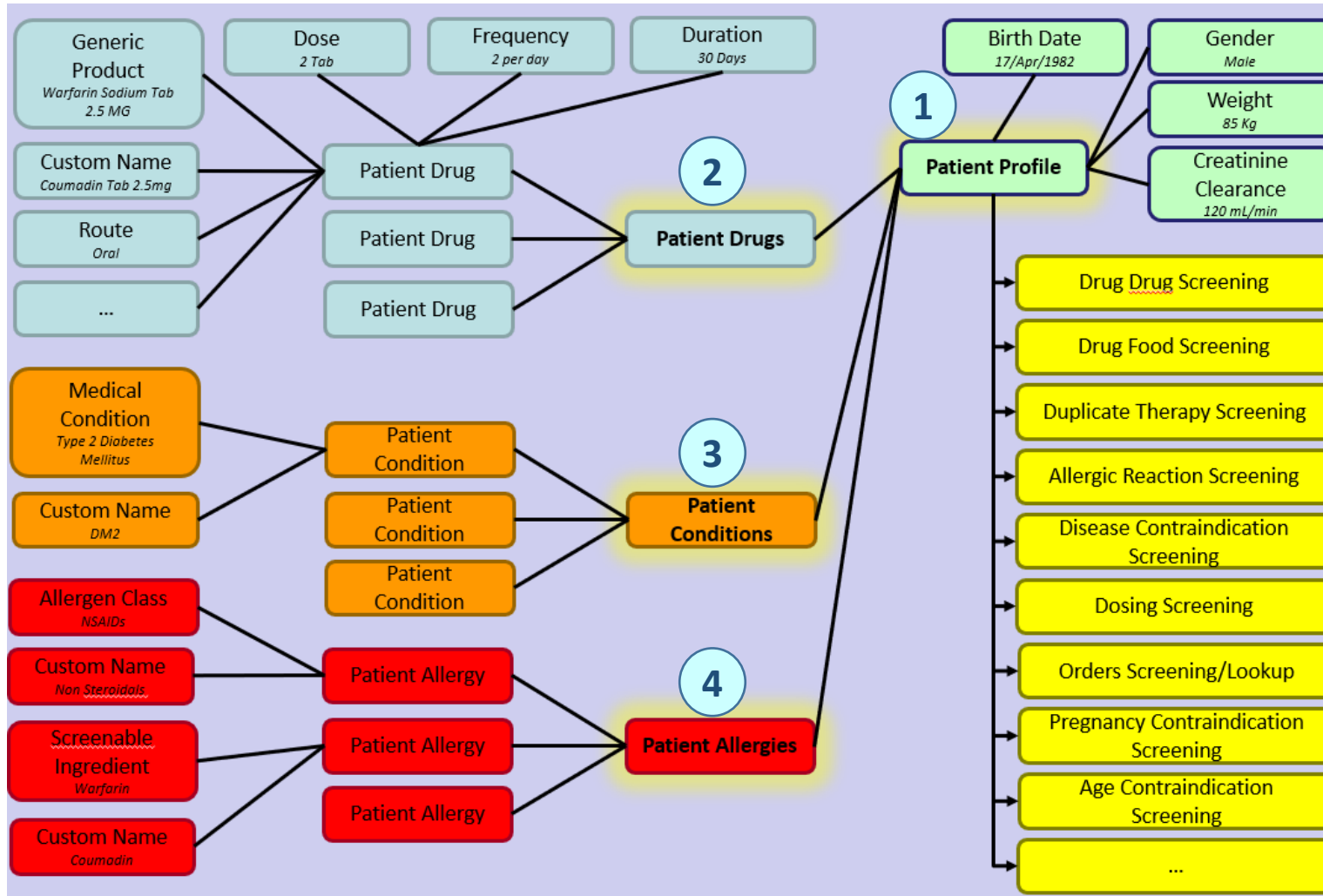
Medi-span臨床解決方案系統

◆成大醫院購置模組：

- ✓ 藥物劑量檢核
- ✓ 重複用藥檢核
- ✓ 藥物-藥物交互作用檢核
- ✓ 藥物過敏檢核
- ✓ 藥物-疾病禁忌症檢核
- ✓ 懷孕/哺乳/年紀/性別檢核



Medi-Span : 臨床參數



Patient Profile

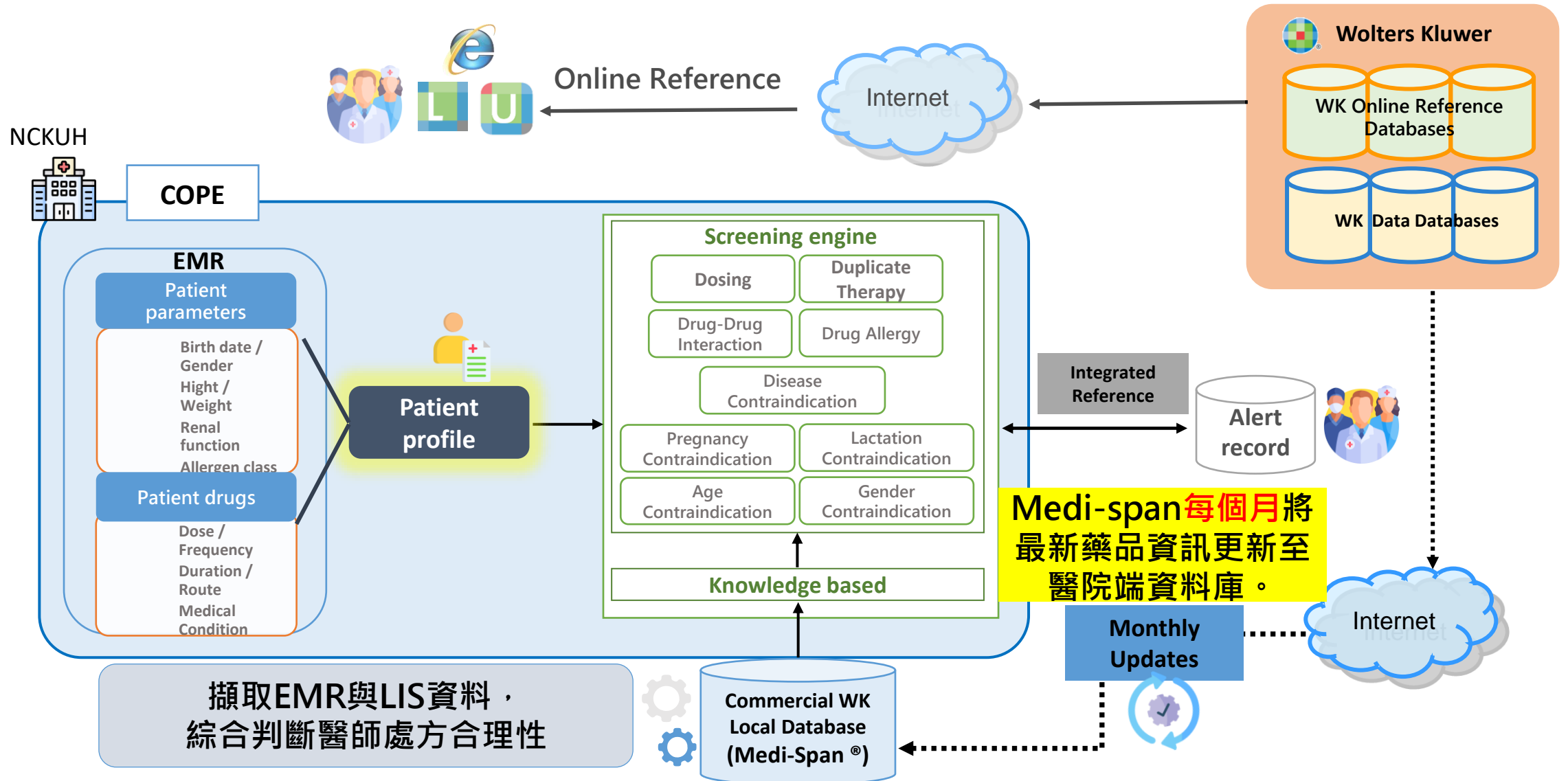
- Patient ID
- Birth Date
- Gender
- Weight
- BSA
- Creatinine Clearance
- Serum Creatinine
- Urine Output

Patient Conditions

- Diagnosis, ICD-10 (2014)



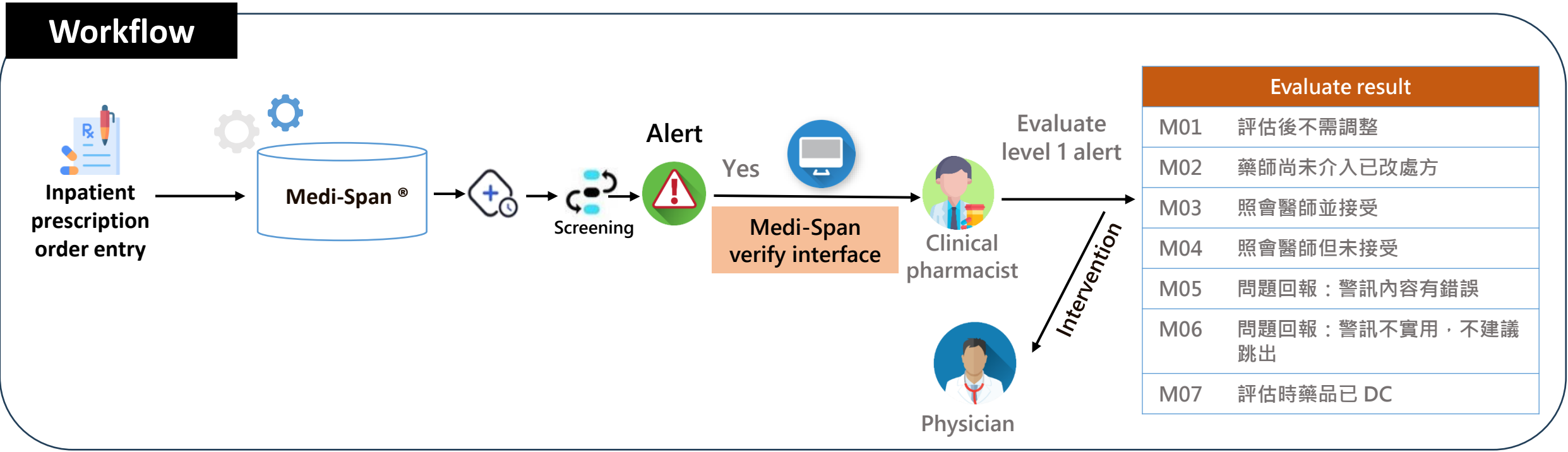
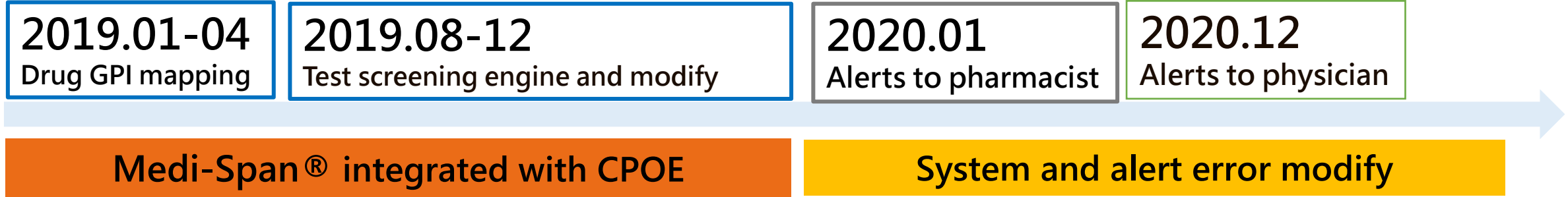
Medi-Span[®] : Clinical inputs



Medi-Span® in NCKUH

Dosing, Interaction
Drug Allergy, Duplicate therapy
Disease, Age, Gender, Pregnancy,
Lactation Contraindication

Interaction
Pregnancy Contraindication



CPOE：醫令系統(Computerized Provider Order Entry, CPOE)



Medi-Span[®] 醫囑系統

◆ 醫囑端：藥物交互作用與懷孕檢核

藥品交互作用、過敏藥、同類藥與藥品極量 檢核

請確認藥品警訊，若有疑義，請電洽藥劑部6515

底色： 限制(禁止開立) 過敏藥底色(依嚴重程度): 不清楚/未選取 輕度 中度 嚴重

類別		詳	提示說明	理由
交互作用	警示	詳	您目前所開立的Warfarin 與目前開立的 Amiodarone 檢核出交互作用,請見詳細說明	已調整使用劑量,不修改
交互作用	警示	詳	您目前所開立的Warfarin 與之前院內開立之(2024/09/19)(住院)(一般內科)([REDACTED] 醫師)所開立: Diclofenac 檢核出交互作用,請見詳細說明	已調整使用劑量,不修改
MediSpan [Interaction]	警示	詳	Amiodarone may inhibit hepatic metabolism and increase the anticoagulant effect of vitamin K antagonists (e.g. Warfarin 1mg/tab). Bleeding may occur.	已調整使用劑量,不修改

*欲反回畫面修改請按[理由]欄位後面的button

同類藥併用詳細資料 **F12-確認**



住院系統建立MediSpan[®]藥師審核作業

成大醫院PCS系統 (黃千惠)

系統功能 住院藥局調劑作業 住院藥局發藥作業 住院藥局補發作業 住院藥局退藥作業 補列印給藥明細與藥袋 其餘項目

我的病人
我的最愛
系統版本更新記錄查詢
切換使用者
登出

結束
病歷系統與健保作業
醫師人員作業
住院醫囑系統
院內感染控制
入院管理系統
營養供膳系統
護理站書記
手術麻醉系統
共用系統
臨床護理
病患就醫資訊整合
IC卡

住院藥局系統
資訊室專用
成大電子表單
安寧療護系統

院外自備藥

查詢 病床 姓名 病歷號 詳細 LIS 叫血 PACS EMR 護理 藥歷 ICU 急調病歷 TP
科別 主治 身份 入院日 住院天數 身高 體重

藥歷 歷史處方 匯出

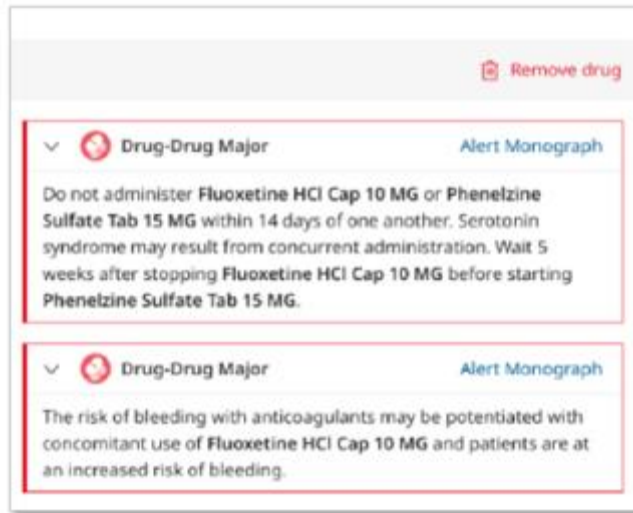
1/13 ~ 2024/11/13 全部 Scr Ccr
GPT Bil-T K+ Ca++

線上作業
查詢作業
化療作業
TPN作業
維護作業
統計作業
個案追蹤管理作業
住院首日量每日量判別

住院藥局調劑作業
住院藥局發藥作業
住院藥局補發作業
住院藥局退藥作業
補列印給藥明細與藥袋
ADC停當機補展作業
補列印調配單
UD藥品狀態查詢
補發藥包機文字資料
住院藥局貴冷管領藥作業
藥局Create RxPackingState作業
UD車複核
處方審核作業
MediSpan審核作業



Medi-Span[®] : 警訊分級系統



SHORT MESSAGE

A short message that describes the current interaction or adverse effect, depending on alert severity and rules set by the institution

彈性調控訊息

Level 1

■ Major / Contraindicated

Level 2

■ Moderate / Not Recommended

Level 3

■ Minor / Extreme Caution / Use Cautiously / Informational



Medi-Span[®] 藥師審核系統

床號

包括M00和M07

診斷碼	診斷英文名稱	診斷名稱
A419	Sepsis, u...	敗血症，未明示
D649	Anemia,...	貧血
E119	Type 2 ...	第二型糖尿病，未

主診斷(problem)

- 1.Fever, suspect tracheobronchitis, urinary tract infection, or recurrence of HLH
- 2.Acute respiratory failure with mild acute respiratory distress syndrome s/p tracheal intubation and mechanical ventilation
- 3.Pulseless ventricular tachycardia for 37 secs with cardiopulmonary resuscitation 10 secs on 10/23; intermittent pulseless ventricular tachycardia up to 1 min on 10/28 status post cardioversion *5 and cardiopulmonar-cerebral resuscitation 1+1 min; ventricular tachycardia with pulse ~20 secs *2 on 2024/10/31
- 4.Enterococcus faecium bacteremia

病人基本資料

科別 心臟血管科 主治 身份別 健保 入院日 H: 157.5/W: 56.8

病床 CCU 姓名 病歷號 男 73歲

Scr 2.26 Ccr 22.3 K 3.6 Ca 8.1 eGFR 29 ALP

Dialysis 2024/11/14 08:00:00 HD CVVH PD

連結洗腎模式

評估結果	評估原因	建議回饋	項目名稱	檢核級數	學名	醫囑內容	回傳訊息	詳細說明	查詢	病歷號	床號	項目代碼
M01 - 評估後...			Dosing	MAJOR	Colistin	[Colistin(L...	警訊內容		<input type="button" value="查詢"/>			A01
請選擇評估結果			DiseaseCo...	Contraind...	Bethanec...	[Bethanec...	警訊內容	v	<input type="button" value="查詢"/>			A05

The frequency of every 8 hours exceeds the usual frequency of 1 to 2 times per day.

警訊內容

資料庫連結

Short message





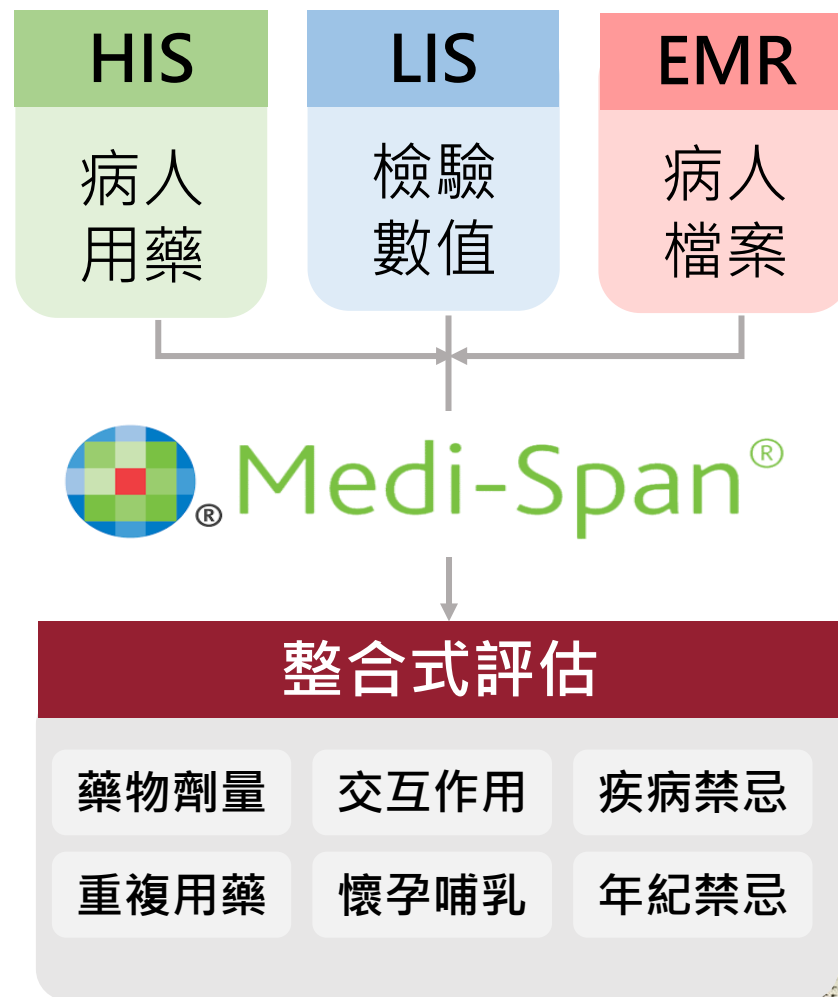
Medi-Span[®]-檢核項目類別

開立起 2024/11/14 迄 2024/11/14 護理站 病歷號

評估狀態： 未評估 已評估 全部 評估藥師 級數 1,2,3

檢核項

- A01 - Dosing
- A011 - IngredientDosing
- A02 - Interaction
- A03 - DuplicatedTherapy
- A04 - AllergicReactions
- A05 - DiseaseContraindications
- A06 - PregnancyContraindications
- A07 - LactationContraindications
- A08 - AgeContraindications
- A09 - GenderContraindications



Medi-Span[®] - 藥師審核評估

診斷 Cardiac arrest
Hypoglycemia, unspecified
Hyperpotassemia
Other disorders of muscle, ligament, and fascia

Scr 8.71 Ccr 9.7129735 K 3.7 Ca 8.1 eGFR 6.5
ALT 24 AST 315 BIL-T 0.3 Hemo HD 2023/11/29 08:00:00

評估結果	評估原因	建議回饋	項目名稱	檢核級數	學名	醫囑內容	回傳訊息	詳細說明	查詢
請選擇評...			DiseaseCont...	Contraindic...	Insulin Glar...	【Change...	警訊內容	v	查詢
請選擇評...			DiseaseCont...	Contraindic...	Insulin Aspart	【Change...	警訊 警訊內容	y	查詢
請選擇評...			DiseaseCont...	Contraindic...	Insulin Aspart	[Insulin Asp...	警訊內容	v	查詢

請選擇評估結果

- M01 - 評估後處方不需調整
- M02 - 評估時處方已修改
- M03 - 評估後需照會醫師並接受
- M04 - 評估後需照會醫師但未接受
- M05 - 警訊內容有錯誤或不實用
- M06 - 病人資料有錯誤或缺漏

記錄建議修改警訊或提供建議的內容

評估結果	評估原因	建議回饋	項目名稱
M01 - 評估...			Dosing
	M0101 - 目前檢驗數值正常或無禁忌 M0102 - 病情需求-手術 M0103 - 病情需求-病人先耐已耐受 M0104 - 病情需求-專科建議 M0105 - 病情需求-劑量適當		
M02 - 藥師...			用
	M0201 - 劑量或頻次調整 M0202 - 劑型更改 M0203 - 藥品更改		
M03 - 照會...			
	M0301 - 劑量或頻次調整 M0302 - 劑型更改 M0303 - 藥品更改 M0304 - 停用藥品		
M04 - 照會...			Dosing MAJOR
	M0401 - 臨床經驗或病情需求，會持續監測用藥反應 M0402 - 交互作用已錯開服藥時間		
M05 - 問題...			Dosing
	M0501 - 與資料庫或現行指引不符 M0502 - 與健保給付不符 M0503 - 與院內品項不符		
評估結果	評估原因	建議回饋	D
M06 - 問題...			D
	M0601 - 基本資料錯誤 M0602 - 無鍵入相關適應症		

Administration of Insulin Glargine 300U/mL , 1.5mL/pen is contraindicated in Hypoglycemia. Since Hypoglycemia is related to Hypoglycemia, unspecified,

Medi-Span[®] 檢核：ICU連續性血液透析替代療法 劑量/頻次

床號

包括M00和M07

診斷碼	診斷英文名稱	診斷名稱
A419	Sepsis, u...	敗血症，未明示病
A90	Dengue ...	登革熱[典型登革熱]
N179	Acute ki...	急性腎衰竭

主診斷(problem)

- 1.Acute respiratory failure, s/p high flow nasal oxygen (2024/11/13-)
- 2.Suspect severe fever with thrombocytopenia syndrome (SFTS)
- 3.Acute kidney injury, initiate continuous renal replacement therapy (CRRT) since 2024/11/13 for septic shock
- 4.Transaminitis, suspected SFTS and septic shock related
- 5.Hyponatremia

科別 主治 身份別 入院日 H: 176/ W: 100.4

病床 姓名 病歷號 男 57歲

Scr Ccr K Ca eGFR ALT AST BIL-T

Dialysis HD CVVH PD

評估結果	評估原因	建議回饋	項目名稱	檢核級數	學名	醫囑內容	回傳訊息	詳細說明	查詢	病歷號	床號
請選擇評...			Dosing	MAJOR	Levofloxa...	[Levofloxa...	警訊內容		查詢		

The frequency of daily exceeds the usual frequency of every 2 days.



Dose Adjustments in CRRT (CVVH/CVVHD/CVVHDF)

If usual recommended dose is 250 mg every 24 hours

No dosage adjustment necessary (Ref)

If usual recommended dose is 500 mg every 24 hours

500 mg initial dose, then 250 mg every 24 hours (Ref) **or**
500 mg every 48 hours (Ref)

If usual recommended dose is 750 mg every 24 hours

750 mg initial dose, then 500 mg every 24 hours (Ref) **or**
750 mg every 48 hours (Ref)



Medi-Span 檢核：腎功能劑量/頻次

住院病患清單 | MEDISPAN審核作業 | 處方查詢 | 病擔總覽

開立起 2024/ 2/20 迄 2024/ 2/21 護理站 病歷號 床號

評估狀態： 未評估 已評估 全部 評估藥師 查詢

檢核項 A01 - Dosing 級數 1 清除 包括M00和M07

床號	病歷號	姓名	未評	已評	最嚴重級數
07C71A			0	2	1

報告結果-常規(緊急)生化檢驗報告 趨勢圖

選	檢驗名稱(單位)	24-02-21 07:02 (血液)	24-02-21 07:02 (血液)	24-02-20 05:24 (血液)	24-02-19 12:07 (血液)	24-02-19 05:23 (血液)	24-02-17 06:44 (血液)
<input type="checkbox"/>	K(mmol/L)	4.0		5.3		5.8	5.2
<input type="checkbox"/>	NA(mmol/L)	139				126	127
<input type="checkbox"/>	CL(mmol/L)	96					
<input type="checkbox"/>	CO2(mmol/L)						
<input type="checkbox"/>	CA(mg/dL)	9.5					
<input type="checkbox"/>	P(mg/dL)	7.0					
<input type="checkbox"/>	MG(mg/dL)	3.2					
<input type="checkbox"/>	BUN(mg/dL)					90	48
<input type="checkbox"/>	CREA(mg/dL)	4.22				3.82	1.86
<input type="checkbox"/>	eGFR	13.2				14.9	34

科別 高齡醫學部 主治 份別 健保 入院日 H: 142/W: 49.9

病歷 姓名 93歲 藥歷 處方查詢 EMR LIS 明細

診斷 Other dyspnea and respiratory abnormalities
Obstructive chronic bronchitis without mention of acu
Diabetes mellitus without mention of complication, Ty
Malignant essential hypertension

Scr 4.22 Ccr 7.7 K 3.8 Ca 9.5 eGFR 13.2
ALT 25 AST 41 BIL-T 0.7 Dialysis
 HD CVVH PD

評估結果	評估原因	建議回饋	項目名稱	檢核級數	學名	醫囑內容	回傳訊息	詳細說明	查詢	病歷號	床號	項目代碼
M03 - 評...	M0301 - ...	AKI day 3...	Dosing	MAJOR	Ampicillin ...	[Ampicilli...	警訊內容		查詢			A01
M01 - 評...	M0101 - ...		Dosing	MAJOR	traMADOL	[traMADO...	警訊內容		查詢			A01

Warning

[Ampicillin 1g/Sulbactam 0.5g(Sulampi) 1.5 g/vial] 3 g IVD Q6H x3天. [註：(屆期再評估)]

- ◆ AKI，Medi-Span檢核Ampicillin/Sulbactam跳出警示
- ◆ 建議1.5g-3g q24h for CrCl<15ml/min

The daily dose of 12 grams exceeds the usual dose of 1.5 to 3 grams.
The frequency of every 6 hours exceeds the usual frequency of daily.
For treatment of Infection.



Medi-Span 檢核：藥物-藥物交互作用

科別 外傷科 主治 身份別 健保 入院日 H: 170.5/ W: 59.4
 病床 姓名 病歷號 男 67歲 藥歷 處方查詢 EMR LIS 明細

診斷 Acute respiratory failure
 Organic personality syndrome
 Fracture of vault of skull, closed with subarachnoid, s
 Fracture of other facial bones, closed

Scr 0.88 Ccr 68.4 K 4.5 Ca 8.4 eGFR 86
 ALT 330 AST 168 BIL-T 0.4 Dialysis
 HD CVVH PD

評估結果	評估原因	建議回饋	項目名稱	檢核級數	學名	醫囑內容	回傳訊息	詳細說明	查詢	病歷
M02 - 評...	M0201 - ...		Interaction	Major	Ciprofloxacin	[Ciproflox...	警訊內容	v	查詢	1133
M02 - 評...	M0201 - ...		Interaction	Major	Warfarin	【Change...	警訊內容	v	查詢	1133
M02 - 評...	M0201 - ...		Interaction	Major	Ciprofloxacin	[Ciproflox...	警訊內容	v	查詢	1133

Hypoprothrombinemic effects of Warfarin 5mg/tab may be increased by Ciprofloxacin 200mg/100mL/btl. Dosage reduction of Warfarin 5mg/tab may be required.

◆ Ciprofloxacin and warfarin 交互作用





「詳細說明」：顯示完整資料

Ciprofloxacin 200mg/100mL/btl and Warfarin 5mg/tab

Management Level	Severity Level	Documentation Level	Labeled Avoidance Level	Onset	Published Interaction Lists
Professional Intervention Required PROFESSIONAL REVIEW SUGGESTED Potential Interaction Risk	MAJOR Moderate Minor	Established PROBABLE Suspected Possible Doubtful/Unknown	Contraindicated Avoid NOT SPECIFIED	DELAYED Rapid	Arizona Center for Education and Research on Therapeutics BEERS CRITERIA Medicaid Provisions in the SUPPORT Act Medicare Part D: Concurrent Opioids and Benzodiazepines Office of the National Coordinator Pharmacy Quality Alliance Not specified

Alert

Hypoprothrombinemic effects of Warfarin 5mg/tab may be increased by Ciprofloxacin 200mg/100mL/btl. Dosage reduction of Warfarin 5mg/tab may be required.

Effect

Hypoprothrombinemic effects of Warfarin 5mg/tab may be increased by Ciprofloxacin 200mg/100mL/btl. Dosage reduction of Warfarin 5mg/tab may be required.

Mechanism

Unknown.

Management

Dosage reduction of Warfarin 5mg/tab may be needed during concurrent administration of Ciprofloxacin 200mg/100mL/btl. Coagulation status should be monitored, at least during the initial period of concomitant use, and the anticoagulant dose should be adjusted, if needed, accordingly. An alternative antimicrobial agent should be considered.

Discussion

Multiple case reports and case series have implicated ofloxacin [1](#) [15](#), ciprofloxacin [2](#) [4](#) [6](#) [7](#) [9](#) [10](#) [11](#) [18](#) [36](#), norfloxacin [3](#) [9](#), levofloxacin [20](#) [21](#) [22](#) [31](#) [34](#), gatifloxacin [23](#) [29](#) [32](#) [33](#), and moxifloxacin [24](#) [26](#) [27](#) [37](#) in causing excessive anticoagulation when given with warfarin. Package labeling for moxifloxacin indicates no significant changes in clotting time have occurred in healthy volunteers [35](#). In 2004, 64 cases involving ciprofloxacin with warfarin were reported to the FDA Spontaneous Reporting System [18](#) and 57 to Health Canada [25](#).

Results from controlled studies are conflicting [12](#) [13](#). Single doses of warfarin alone or on the 4th day of norfloxacin produced no differences in kinetics or anticoagulant effect [5](#). In 3 controlled studies, ciprofloxacin did not significantly alter PT in patients on warfarin [8](#) [14](#) [16](#).

In a case report involving a 77-year-old man [36](#), ciprofloxacin added to a stable warfarin regimen resulted in an increase in INR from 2 to 5.1 after 6 days. He was diagnosed with a cerebral hemorrhage and died within hours.

In a single-dose study, warfarin pharmacokinetics were not altered by levofloxacin [17](#). A case-control analysis has shown conflicting results with levofloxacin [30](#). 33% of patients receiving levofloxacin with warfarin had high INRs [31](#). Seven cases of excessive anticoagulation in patients on warfarin who were given levofloxacin have been reported [20](#) [21](#) [22](#). In an additional 3 case reports, use of levofloxacin increased INRs to 7- >8.6. One patient died; 2 experienced bleeding and were treated with fresh frozen plasma and vitamin K [34](#). Post-marketing reports document that levofloxacin enhances the effects of warfarin and episodes of bleeding have occurred [19](#). Eleven cases of elevated INR due to concomitant use of levofloxacin with acenocoumarol have been reported [28](#) [41](#).

An 88-year-old man on warfarin for one year was given gatifloxacin [32](#). Coadministration resulted in indeterminably high INR values that required vitamin K and fresh frozen plasma.

In a retrospective review of 92 patients on stable warfarin for >4 weeks (54 levofloxacin and 38 gatifloxacin), 2% of patients in the levofloxacin group had an INR >4. In contrast, 21% of patients on gatifloxacin had an INR >4; 11% required vitamin K [33](#). Levofloxacin slightly increased the INR in a similar review of 21 warfarin-treated patients [38](#). Another review of 205 outpatient anticoagulation clinic patients determined that the coadministration of warfarin with ciprofloxacin, moxifloxacin, and levofloxacin resulted in INR increases of 0.38, 0.7, and 0.75, respectively [40](#).

Coadministration of ciprofloxacin with warfarin in elderly patients with UTIs was associated a 2-fold higher risk of UGI bleeding than other antibiotics (i.e. nitrofurantoin, amoxicillin, norfloxacin) [39](#).

References

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Medi-Span 檢核：藥物-疾病禁忌症檢核

住院病患清單 處方查詢 病簡總覽 **MEDISPAN審核作業**

開立起 2024/ 1/ 5 迄 2024/ 1/ 5 護理站 病歷號 床號

評估狀態： 未評估 已評估 全部 評估藥師 查詢

檢核項 級數 1 清除 包括M00和M07

床號	病歷號	姓名	未評	已評	最嚴重級數	科別	身份別	健保	入院日	H: 151.2/ W: 66.3
07C73A	00626213	盧謝春菊	0	1	1					

病床 姓名 號 85歲 藥歷 處方查詢 EMR LIS 明細

診斷 Pneumonia, organism unspecified
Urinary tract infection, site not specified
Chronic renal failure
Asthma, unspecified, without mention of status asthma

Scr 4.66 Ccr 7.7 K 3.4 Ca 8.2 eGFR 8.9
ALT 15 AST 30 BIL-T 0.4 Dialysis HD CVVH PD

評估結果	評估原因	建議回饋	項目名稱	檢核級數	學名	警囑內容	回傳訊息	詳細說明	查詢
M03 - 評...	M0301 - ...		DiseaseCo...	Contraind...	Bethanec...	【Change...	警訊內容	v	查詢

Warning

【Change】 [Bethanechol(Wecoli)_25mg/tab] 1 tab BIDAC PO

◆ Medi-Span檢核入院診斷ICD-10有asthma，醫師開立bethanechol時系統跳出警示。

Administration of Bethanechol 25mg/tab is contraindicated in Asthma.



Medi-Span 檢核 : Duplicated Therapy(雲端藥歷)

開立起 2024/11/11 迄 2024/11/14 護理站 病歷號 床號

評估狀態: 未評估 已評估 全部 評估藥師 查詢

檢核項 A03 - DuplicatedTherapy 級數 1,2,3 清除

包括M00和M07

診斷碼	診斷英文名稱	診斷名稱
E119	Type 2 ...	第二型糖尿病, 未伴
I10	Essential...	本態性(原發性)高血
I255	Ischemic...	缺血性心肌病變

主診斷(problem)

- 1. Coronary artery disease/ left main coronary artery (LM) + 3-vessel-disease, Syntax score 38, s/p coronary artery (LAD) and drug-eluting stent *2 for left circumflex coronary artery (LCX) and OM
- 2. old cerebrovascular accident (CVA) 2022/4/28
- 3. Sick sinus syndrome and atrioventricular (AV) nodal dysfunction s/p permanent pacemaker impl imaging (MRI) on 2024/3/6
- 4. Hypertension
- 5. dyslipidemia 2024/10/30 LDL-C:70mg/dL

床號	病歷號	姓名	未評	已評	最嚴重級數
09B			2	0	

科別 心臟血管科 主治 身份別 健保 入院日 H: 167.3/W: 67.4

病床 姓名 病歷號 男 78歲 藥歷 處方查詢 EMR LIS 明細

Scr 1.00 Ccr 52.6 K 4.0 Ca 9.3 eGFR 72 ALT 15 AST BIL-T

Dialysis HD CVVH PD

評估結果	評估原因	建議回饋	項目名稱	檢核級數	學名	醫囑內容	回傳訊息	詳細說明	查詢
請選擇評...			Duplicate...		Dexlanso...	[Dexlanso...	警訊內容		查詢
請選擇評...			Duplicate...		Esomepra...	[Esomepr...	警訊內容		查詢

Dexlansoprazole 60mg/cap and Esomeprazole 40mg/tab are in the PPIS AND PCABS class and may represent a therapeutic duplication.





Medi-Span 檢核 : Age Contraindications

住院病患清單 MEDISPAN審核作業 處方查詢 病摺總覽

開立起 2024/11/14 迄 2024/11/14 護理站 07c 病歷號 [] 床號 []

評估狀態: 未評估 已評估 全部 評估藥師 [] 查詢 清除

檢核項 A08 - AgeContraindications 級數 1,2 包括M00和M07

診斷碼	診斷英文名稱	診斷名稱
B1920	Unspecif...	C型病毒性肝炎未
N08	Glomeru...	歸類於他處疾病所
R188	Other as...	其他腹水

主診斷(problem)

- 1.Suspected nephrotic syndrome.
- 2.Hepatitis C virus infection, under interferon treatment but filed 30 years ago.
- 3.liver cirrohsis with ascites accumulation, favored heppatitis c virus related.
- 4.Hypertension.

床號	病歷號	姓名	未評	已評	最嚴重級數
07C	[]	[]	1	0	2

科別 高齡醫學部 主治 [] 身份別 健保 入院日 [] H: 152/ W: 72.3

病床 [] 姓名 [] 病歷號 [] 女 72歲 藥歷 處方查詢 EMR LIS 明細

Scr 0.73 Ccr 58.6 K 3.0 Ca 7.4 eGFR 78 ALT 57 AST 50 BIL-T 0.7

Dialysis HD CVVH PD

評估結果	評估原因	建議回饋	項目名稱	檢核級數	學名	醫囑內容	回傳訊息	詳細說明	查詢
請選擇評...			AgeContr...	Not reco...	Doxazosin	[Doxazosi...	警訊內容	v	查詢

Administration of Doxazosin 4mg/tab is not recommended in Geriatric Patients.

Severity Level
Contraindicated
NOT RECOMMENDED
Extreme caution
Use cautiously
Informational

Alert
Administration of Doxazosin 4mg/tab is not recommended in Geriatric Patients.

Comments
This medication is on the Beers list and should be avoided for use as an antihypertensive in patients 65 and older due to its potential for causing orthostatic hypotension. Avoid in patients with syncope and urinary incontinence.

The information contained in the UpToDate, Inc. databases is intended to supplement the knowledge of physicians, pharmacists, and other healthcare professionals regarding drug therapy problems and patient counseling information. This information is advisory only and is not intended to replace sound clinical judgment in the delivery of healthcare services.

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2023 updated AGS Beers
Criteria® for potentially inappropriate medication
Doxazosin : Avoid use as an antihypertensive



Medi-Span 檢核範例: 年紀檢核

14歲男性 男 14歲 小兒感染診別 劉清泉醫師 肝腎功能

ucosa
Other lesions of oral mucosa
Functional disorders of polymorphonuclear
Unspecified abdominal pain

Vancomycin inj 500mg/vial (Vancomycin)
Augmentin 875/125 mg/tab(Amoxicillin/ Clavulic acid)

警訊審核 處方明細 Medi-Span

項目代碼	項目名稱	料號	藥名	等級	警訊	詳細說明
A01	Dosing	19512A	Ciprofloxacin	3 ...	The daily dose of 2 tablets is below the usual dose of 2.4 to ...	
A08	AgeContraindic...	19512A	Ciprofloxacin	3 Extr...	Administration of Ciprofloxacin 250mg/tab should be used ...	v

警告訊息

Administration of Ciprofloxacin 250mg/tab should be used with extreme caution in Pediatric Patients.

確定

Ciprofloxacin用於<18歲兒童，系統自動跳出警示提醒





國立成功大學醫學院附設醫院
National Cheng Kung University Hospital

生命·愛心·卓越·創新

Medi-Span[®]於多重用藥連貫性服務



成大醫院多重用藥頁籤

多重用藥病人

- (1) 口服用藥品項(含自備藥物)≥10項
- (2) Age≥65 y/o
- (3) eGFR (ml/min/1.73m²)或 CrCl (ml/min) < 60

住院病患清單 多重用藥評估

病歷號 ... 床號 ID 「住院」及「出院」用藥評估 檢核日期 ~

評估狀態: 已評估 未評估 全部 病人狀態: 住院中 已出院 管灌狀態 否 查詢 清除 匯出 查個人

檢核日	病床號	病歷號	姓名	病床	姓名	病歷號	男 71歲	明細	LIS	叫血	PACS	EMR	護理	藥歷	ICU	急診				
				科別	主治	身份	入院日	住院天數	7	B	轉運	三級								
				身高	cm	體重	kg	BUN	.61	eGFR	43	Cr	27	AST	671	ALT	273	Bil-T	0.3	轉床: 06 ->06 2024-05-18 13:46

顯示「轉床紀錄」

- 「處置建議」
- 0 - 應持續使用
 - 1 - 續用，但需調整劑量
 - 2 - 應停用
 - 3 - 應新增用藥

處置建議	警訊	Medi	藥品名稱	用量	單位	頻次	用法	備註	MRCI	查詢	醫令碼	醫令序	藥疑
應持續使用	警訊	Medi	Acetaminophen 5...	1	tab	Q6H PR...	PO	if fever > 38	3.5	查詢	022026	225	藥疑
0 - 應持續...	警訊	Medi	Atorvastatin 立普...	0.5	tab	QD	PO		3				藥疑
0 - 應持續...	警訊	Medi	Bethanechol 25m...	1	tab	TIDAC	PO		5				藥疑
0 - 應持續...	警訊	Medi	Carvedilol 6.25mg...	1	tab	QDPC	PO		2				藥疑
0 - 應持續...	警訊	Medi	Carvedilol 6.25mg...	0.5	tab	QNPC	PO		4	查詢	148724	170	藥疑
0 - 應持續...	警訊	Medi	Entecavir 貝樂克 0...	1	tab	QODAC	PO		4	查詢	302326	33	藥疑
0 - 應持續...	警訊	Medi	Glyxambi 25/5mg...	1	tab	QD	PO		2	查詢	302223	32	藥疑
0 - 應持續...	警訊	Medi	Metformin 庫魯化...	0.5	tab	QD	PO		3	查詢	583129	34	藥疑
0 - 應持續...	警訊	Medi	Mirabegron 25mq...	1	tab	QD	PO		2	查詢	603320	38	藥疑

疑義處方填寫並系統發送給門診醫師

- (1) 雲端藥歷未評估，顯示訊息做提醒
- (2) 病人入院時雲端藥物評估結果
- (3) 出院前代入一個月內雲端與出院帶藥做評估及整合

來源	檢核項目	學名	檢核日	理由分類	理由	說明	評估結果	處理進度	照護者	處置
藥局	入院未開立	Clopidogrel	2024/5/15	應用藥而...	因手術或...		3	4 - 評估後...	3 - 結案	
門診	入院未開立	Sennoside...	2024/5/15	症狀治療...	症狀治療...		3	4 - 評估後...	3 - 結案	

- 1.目前使用的藥物是否都有適應症
- 2.藥物劑量頻次是否符合病人目前肝腎功能
- 3.審視有無需要照會之警訊(含PIM)
- 4.若病人目前是管灌進食，有無開立不宜磨粉品項

醫囑內容	開始時間	結束時間
[Diclofenac(Volen)_10mL/btl 1 gtt OS] QID[自備藥]	2024-05-12 1456	2099-12
[Levofloxacin(Cravit)_0.5% 5mL/btl 1 gtt OS] QID[自備藥]	2024-05-12 1456	2099-12

藥師照會醫師後需填寫
臨床藥事照護介入紀錄

建議內容 評估結果 醫師未接受理由輸入

會診藥師 臨床藥事照護介入紀錄

(1) 評估後不需調整
(2) 藥師尚未介入已改處方
(3) 照會醫生並接受
(4) 照會醫生但未接受

MRCI總分 40.5 存檔

MediSpan檢核：多重用藥DDI

病歷號 [] 床號 [] ID [] 護理站 [選擇] 檢核日期 2024/11/ []

檢核狀態： 入院第3日 入院後每7日 全部

評估狀態： 已評估 未評估 全部

病人狀態： 住院中 已出院

管灌狀態 是

檢核日	病床號	病歷號	姓名
2024-11-09	[]	[]	[]

病床 [] 姓名 [] 病歷號 [] 女 78歲 [] 明細 LIS 叫血 PACS EMR 護理 藥歷 ICU []
科別 腎臟科 主治 [] 身份 健保 入院日 [] 住院天數 46 DNR 抗 雲 轉運三級
身高 160.0 cm 體重 40.0 kg BUN 19 Crea 0.44 eGFR ≥90 Ccr 37 AST 14 ALT 37 Bil-T 0.3 七天內轉床結

處置建議	警訊	Medi	藥品名稱	用量	單位	頻次	用法	備註	MRCI	開始日期
0 - 應持續...	警訊	Medi	Fluconazole cap ...	1	cap	QDPC	PO		3	2024/1...
0 - 應持續...	警訊	Medi	Flucytosine 500m...	2	tab	Q12H	PO	(屆期再評估)	5.5	2024/1...
0 - 應持續...	警訊	Medi	Loperamide 2mg/...	1	cap	BID PRN	PO	如果持續...	3	2024/1...
0 - 應持續...	警訊	Medi	Lorazepam 0.5mg...	1	tab	HS PRN	PO	若仍失眠...	3	2024/1...
0 - 應持續...	警訊	Medi	Mecobalamin 500...	1	cap	BIDPC	PO		4	2024/1...
0 - 應持續...	警訊	Medi	Prednisolone tab ...	1	tab	BID	PO	hypereosi...	4	2024/1...
0 - 應持續...	警訊	Medi	Trazodone 50mg/...	1	tab	HS	PO		4	2024/1...
0 - 應持續...	警訊	Medi	Zinc Gluconate 錠 ...	1	tab	TIDAC	PO		6	2024/1...

項目名稱	檢核級數	回傳訊息
AgeContra...	Extreme ca...	Administration of Trazodone 50mg/tab should be used with extreme caution in Geriatric Patients.
Interaction	Moderate ...	Plasma concentrations and pharmacologic effects of trazodone may be increased by moderate CYP3A4 inhibitors (eg, Fluconazole 50mg/cap).

Drug Interactions



Title TraZODone / CYP3A4 Inhibitors (Moderate)

Risk Rating C: Monitor therapy

Summary CYP3A4 Inhibitors (Moderate) may increase the serum concentration of TraZODone. **Severity** Moderate **Reliability Rating** Fair

Patient Management Consider the use of a lower trazodone dose and monitor for increased trazodone effects (eg, sedation, QTc prolongation) if combined with moderate CYP3A4 inhibitors.



Medi-Span[®]於Pre-ESRD藥師門診

◆藥物交互作用

一般藥品審核確認 | 急慢性腎臟病藥事照護作業

病患來源: 0 - 門診 | 處方日期: 2024/11/11 ~ 2024/11/11 | 領藥窗口: | 領藥號: | 病歷號: | F1-查詢

狀態: 全部 未確認 已確認 | 科別: | 全部 有警訊 無警訊 整合照護 腎 Medi-Span | ALL | 全部

來源: 門診 | 狀態: | 領藥窗口: | 慢箋: 23 | 領藥號: | 序號: 0 | 病歷號: 1111H0030200002

確認審核藥師: - 黃千惠 | 檢視藥品 | ADR(含藥敏) | 檢視報告 | EMR | LIS

H-302 賴 | 男 72歲 | 一般內科 | 醫師 | 肝腎功能 | CREA:1.88(2024/11/11) | eGFR:35(2024/11/11) | H/W:143.00/53.6000(2024/11/11)

Chronic kidney disease, stage 3 (moderate) | NKDA
Atherosclerotic heart disease of native cor | 檢驗值:
Hyperlipidemia, unspecified | CREA:1.88(2024/11/11)
Type 2 diabetes mellitus with hyperglycer

警訊審核 | 處方明細 | Medi-Span

評估結果	建議回饋	項目名稱	藥名	等級	警訊	詳細說明	項目代碼	料號
M01 - 評估後...		Dosing	Sodium bicarbo...	Minor	The daily dose of 1 t...			
評估時處方已修改		Interacti...	Atorvastatin	Major ...	Plasma concentratio...	v		
M01 - 評估後...		AgeCon...	Sodium bicarbo...	Extreme ...	Administration of S...	v		

MediSpan
評估確認

Plasma concentrations of statins (i.e. atorvastatin, lovastatin and simvastatin) may be increased when co-administered with imidazoles (itraconazole, ketoconazole and posaconazole). Adverse effects, including myopathy and rhabdomyolysis may occur. Coadministration may be contraindicated in offi





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MediSpan[®] 藥師審核分析





Medi-Span® 111-112年 Level 1 各警訊類別之評估結果(UD)

111 年 (level 1 alert) 評估結果	Dosing	Interaction	Disease contraindicated	Pregnancy contraindicated	Age contraindicated	Total
M01-評估後不需調整	17,364	4,440	4,525	975	146	27,450
M02-藥師尚未介入處方以修改	479	51	51	3	0	584
M03-照會醫師並接受	292	40	19	0	0	351
M04-照會醫師但不接受	4	2	0	0	0	6
M05-警訊內容有錯誤	207	32	54	6	13	312
M06-警訊內容不實用	169	102	60	1	5	337
M07-評估時藥品已DC	5,991	1,737	1,548	324	29	9,629
Total	24,506	6,404	6,257	1,309	193	38,669
照會醫師接受率%	98.6%	95.2%	100.0%	N/A	N/A	98.3%

112 年 (level 1 alert) 評估結果	Dosing	Interaction	Disease contraindicated	Pregnancy contraindicated	Age contraindicated	Total
M00-超過3天未評估	273	34	76	4	2	389
M01-評估後不需調整	19,156	3,355	4,780	841	162	28,294
M02-藥師尚未介入處方以修改	440	42	70	1	1	554
M03-照會醫師並接受	541	74	49	0	0	664
M04-照會醫師但不接受	10	6	3	0	0	19
M05-警訊內容有錯誤	189	0	14	1	6	210
M06-警訊內容不實用	76	2	9	1	10	98
M07-評估時藥品已DC	6,669	1,525	1,632	472	25	10,323
Total	27,354	5,038	6,633	1,320	206	40,551
照會醫師接受率	98.2%	92.5%	94.2%	N/A	N/A	97.2%

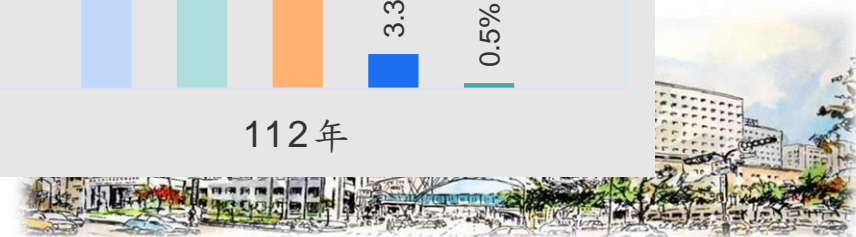
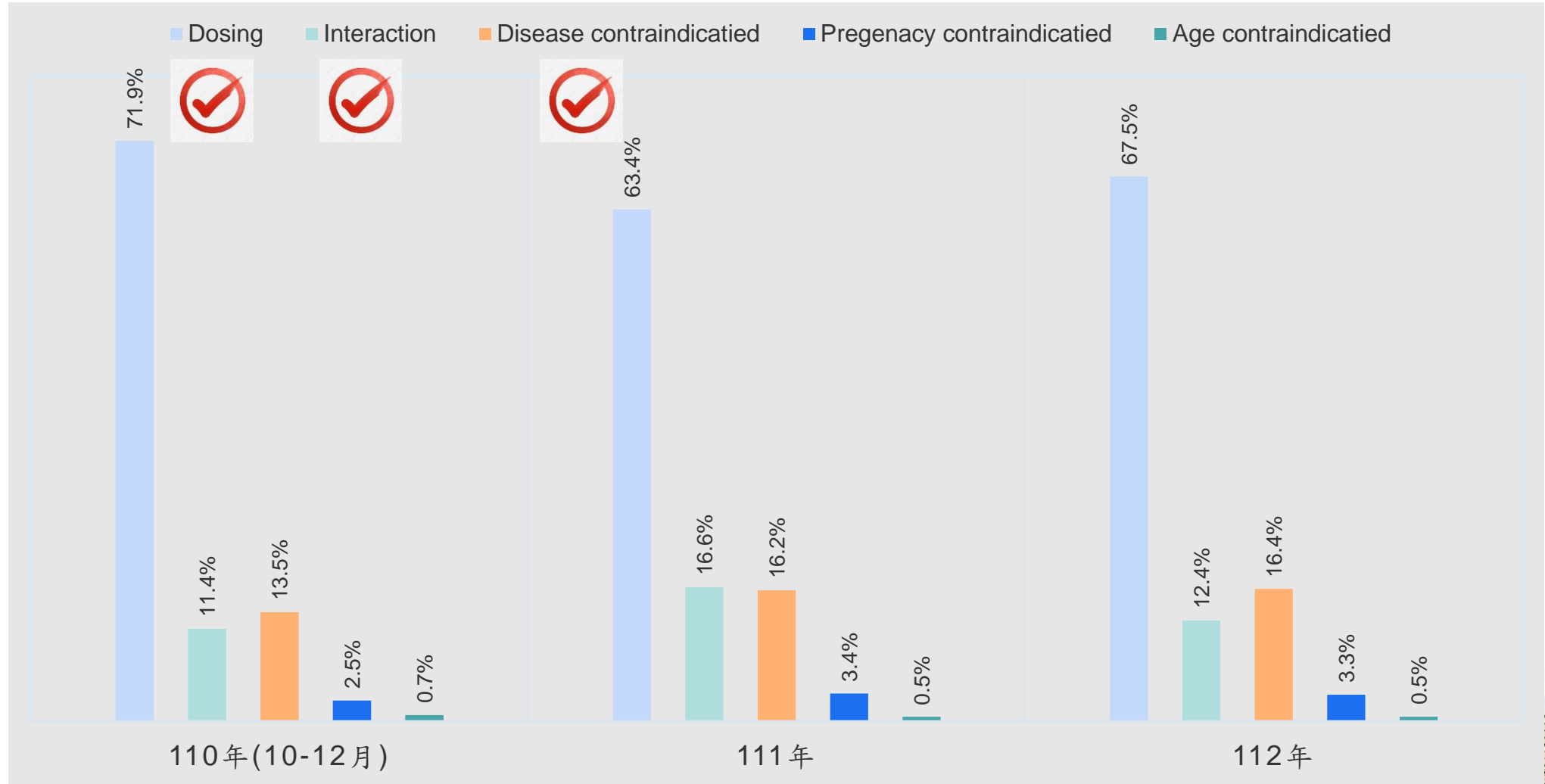
註：112年12月才改評估結果名稱跟定義→ M00-超過3天未評估; M01-評估後處方不需調整; M02-評估時處方已修改; M03-評估後需照會醫師並接受; M04-評估後需照會醫師但未接受;

M05-警訊內容有錯誤或不實用; M06-病人資料有錯誤或缺漏; M07-病人異動系統自動DC處方



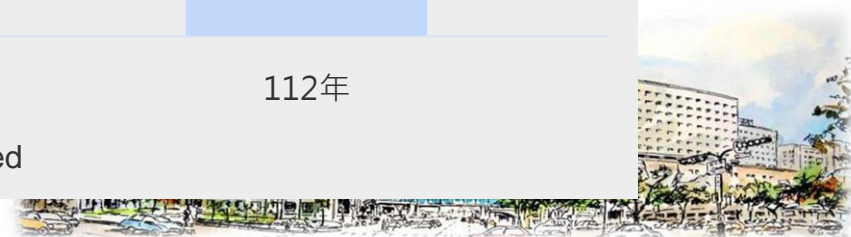
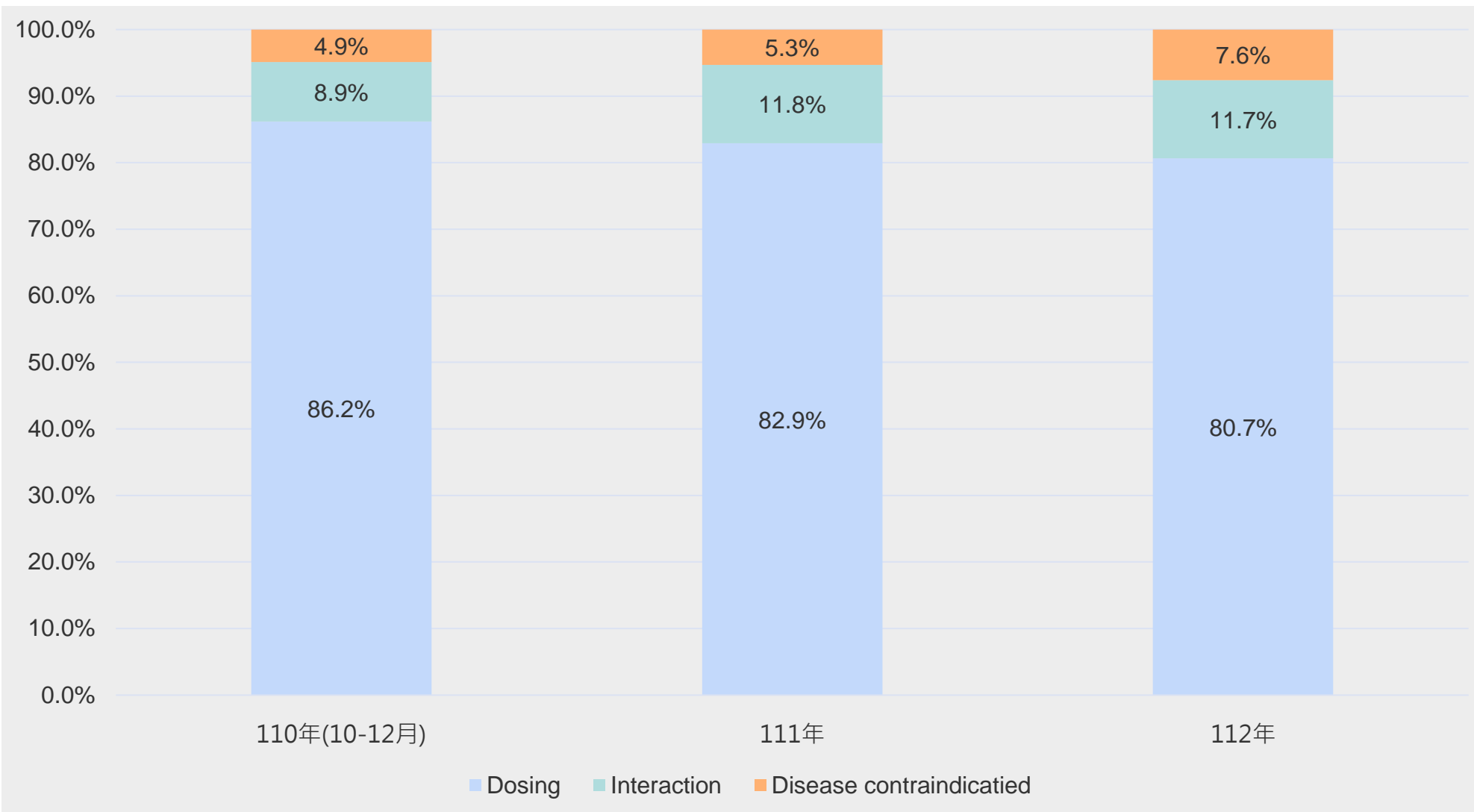


Medi-Span® 110-112年 level 1 各警訊類別分佈





Medi-Span[®] 110-112年照會醫師level 1 各警訊類別佔比





Medi-Span[®] 藥物交互作用警訊優化

藥物品項	項目(Condition)	警訊內容	參考資料	修改內容
Domperidone (Wempty) 1mg/mL,60ml/btl & Verapamil 40mg/tab (Isomil)	•Severity (Domperidone/CYP3A4 Inhibitors (Moderate)	藥師反應Medi-Span未顯示此 level 1警訊, 與Lexidrug [™] 嚴 重等級不同。	Lexidrug [™] : Severity → Major Medi-Span [®] : Severity → Moderate	Moderate → Major
Domperidone (Wempty) 1mg/mL,60ml/btl & Verapamil tab 40mg/tab (Isomil)	•Documentation Level (Domperidone/CYP3A4 Inhibitors (Moderate)	藥師反應Medi-Span未顯示此 level 1警訊。	因Documentation Level : Suspected低 於Probable, 院內程式設定不顯示。 討論後藥師認為此為重要的DDI警訊, 因臨床需求調整讓警訊顯示。	Suspected→Probable
Domperidone (Wempty)1mg/mL,60ml/btl & Amiodarone 200mg/tab (Cordarone)	•Documentation Level (Domperidone/QT- prolonging Agents (Highest Risk)	藥師反應Medi-Span未顯示此 level 1警訊。	因Documentation Level : Possible低於 Probable, 院內程式設定不顯示。 討論後藥師認為此為重要的DDI警訊, 因臨床需求調整讓警訊顯示。	Possible→Probable
Mycophenolate 250mg/cap (CellCept) & Cholestyramine powder 4g/pack (Choles powder)	•Severity (Mycophenolate/Bile Acid Binding Resins)	藥師反應Medi-Span未顯示 Lexidrug [™] 為X級警訊。	Lexidrug [™] :Severity → Moderate (非level 1)。 討論後藥師認為此為重要的DDI警訊, 因臨床需求調整讓警訊顯示。	Moderate → Major
Leflunomide 20mg/tab (Arheuma) & Cholestyramine powder 4g/pack (Choles powder)	•Severity (Cholestyramine /Pyrimidine Synthesis Inhibitors)	藥師反應Medi-Span未顯示此 level 1警訊, 與Lexidrug [™] 嚴 重等級不同。	Lexidrug [™] : Severity → Major Medi-Span: Severity → Moderate	Moderate → Major





Medi-Span[®]臨床解決方案系統： 成大應用的範圍及演進



臨床藥師常規服務

實習生/
審核處方訓練

住院藥師/
ADC審核處方

門診藥師/審核處方





Potential challenge of Medi-Span[®]

Alert fatigue



Excessive alerts cause **desensitization**, leading to **override** (46.2%-96.2%)^[2] regardless of the alert's importance.

Interoperability



Inflexible integration with other hospitals or systems may **hinder information sharing**.

Disrupted workflow



Not match the **user's local information process/clinical settings** or **needs**.

[1] npj Digital Medicine (2020)3:17. [2] JMIR Med Inform. 2020;8(7):e15653.

**“ Commercial rule-based CDSS
have higher sensitivity but
lower specificity ”**



**“ Optimizing and/or customizing
for intent to enhance usefulness
is both common and necessary ”**





國立成功大學
National Cheng Kung University

THANK
YOU!



Any Questions ?



Medi-Span 警訊修改 追蹤紀錄

◆ 每月臨床會議討論與追蹤

Medication	Alert contents	Ref.	Remark
Domperidone - Verapamil	Medispan 未顯示警訊	Lexicomp Risk Rating X : Avoid combination Severity : Major	DDI- Domperidone / CYP3A4 Inhibitors (Moderate) Severity level : moderate → major (已跟Medispan反應)



Limitation – alert example : Hyperkalemia

1. Contraindicated	Alert content	Reason	Discussion
Disease-Hyperkalemia	Administration of _____ is contraindicated in hyperkalemia (ICD-10 E87.5)	入院診斷高血鉀 (ICD-10 E87.5)	院內：有新增檢驗數值K,INR 與藥品檢核功能，未來應可應用在Medi-span → 等此功能
81 %	Medication ✓ Potassium Gluconate 錠劑 595mg/tab (Radi-K) ✓ Potassium Gluconate oral sol 口服液 20mEq/15mL/amp (K-Glu) ✓ KCl (Potassium Chloride) 針劑 20mEq/10mL/amp	住院期間 不會刪除ICD-10	Medi-span 目前僅檢核腎功能數值，未來其他數值欄位納入考量
17%	✓ Spirolactone 25mg/tab	但K+已恢復正常 or 低 K+需補鉀	

Medi-Span

目前僅接收eGFR、Clcr，其他檢驗值項目正在規劃中。

NCKUH

提供其他檢驗值檢核項目 (INR、Potassium、Bilirubin) 供藥物相容性模組 (Drug Compatible) 規劃。

警訊修改紀錄

優化前期(2023.03-2023.05)

日期	項目	類別	變更類型	藥品	調整內容
2023-04-12	警訊	DDI	Severity level	Anticoagulants-Salicylates (Warfarin-Aspirin)	Major→ Moderate
2023-05-12 (Medispan updated at April)	警訊	DDI	Documentation level	Potassium Salts (Potassium Gluconate, Potassium Chloride)-Spironolactone	Established → Suspected

優化期間(2023.06-2024.02) → 19個警訊機制

12 個劑量範圍、4個嚴重等級(1個藥物交互作用警訊；2個疾病禁忌症； 1個年齡禁忌症)、
2 個藥物交互作用警訊文獻等級、關閉1個劑量警訊檢核

日期	項目	類別	變更類型	藥品	調整內容	Ref
2024-02-20	警訊	Contraindicated (Age)	Severity level	traMADOL inj 針劑 100mg/2mL/amp (TramTOR)	Contraindicated (12 y/o)→ Not recommended	仿單

優化後期(2024.03-2024.05) → 12個警訊機制

7個劑量範圍、4個嚴重等級 (2個藥物交互作用警訊；2個疾病禁忌症)、
1個藥物交互作用警訊文獻等級



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升級 Wrapper 版本的優勢 - 對藥師與臨床人員

- **標準化的警示和圖標**：藥師可接收具有一致輸出格式和圖標的標準化警示，有助於快速識別警示的嚴重程度和原因，例如藥物交互作用、過敏或禁忌症。
- **量身定制的篩選**：Wrapper 使用新處方、舊處方籤和當前診斷等分類，確保藥師只看到與當前臨床情況相關的警示，提升工作效率。
- **進階劑量篩選**：Wrapper 支持複雜的劑量指示，如分次劑量、遞減劑量和替代給藥途徑，使藥師在複雜情況下也能確保患者獲得適當的劑量。
- **腎功能和體表面積計算**：自動計算肌酐清除率和腎小球過濾率等關鍵因素，確保對腎功能受損患者進行精確劑量調整，這對藥師至關重要。



Medi-span臨床解決方案系統： 成大醫院購置模組

模組名稱	檢核項目
藥物劑量檢核	劑量、頻次、使用期間、使用途徑、腎功能劑量調整...等
重複用藥檢核	同成分重複用藥、同藥理機轉重複用藥
藥物-藥物交互作用檢核	交互作用嚴重度、發生時間快慢、文獻完整度...等
藥物過敏檢核	同成分過敏藥物、同結構類別過敏藥物
藥物-疾病禁忌症檢核	依ICD-10檢核
懷孕/哺乳/年紀/性別檢核	懷孕/哺乳風險、小兒不適當用藥、老年不適當用藥、藥物對生殖力影響...等





Adoption of Healthcare Information Technology

→ Improve patient outcomes

處方醫令系統應設有
防止錯誤用藥之警示機制
(導入智慧化檢核資訊及時整合病人
相關數據, 提供醫療決策之參考)



定期檢討警示系統(包含是否有不必要警示
導致警示疲勞), 以避免沒注意到提醒
或系統故障時對病人安全造成風險

