臺中榮民總醫院
Taichung Veterans General Hospital

中榮官網　中榮FB

周全性老年人藥物評估
藥師於全人照護之角色

臺中榮民總醫院 藥學部
黃士鳴藥師

臺中榮民總醫院
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愛心 · 品質 · 創新 · 當責
Compassion Quality Innovation Accountability

Outline

1. 高齡病人的特殊性
2. 周全性老年人藥物評估
3. 老年人藥物評估工具
4. 藥師在全人照護的角色

自由時報
Liberty Times Net

首頁 > 報紙 > 地方

〈南部〉8旬翁吃19種藥 整合後剩6種

2017-01-04

〔記者王俊忠／台南報導〕患多
多，曾在服藥後身體不適、到奇
齡醫學整合門診幫忙整理後，王

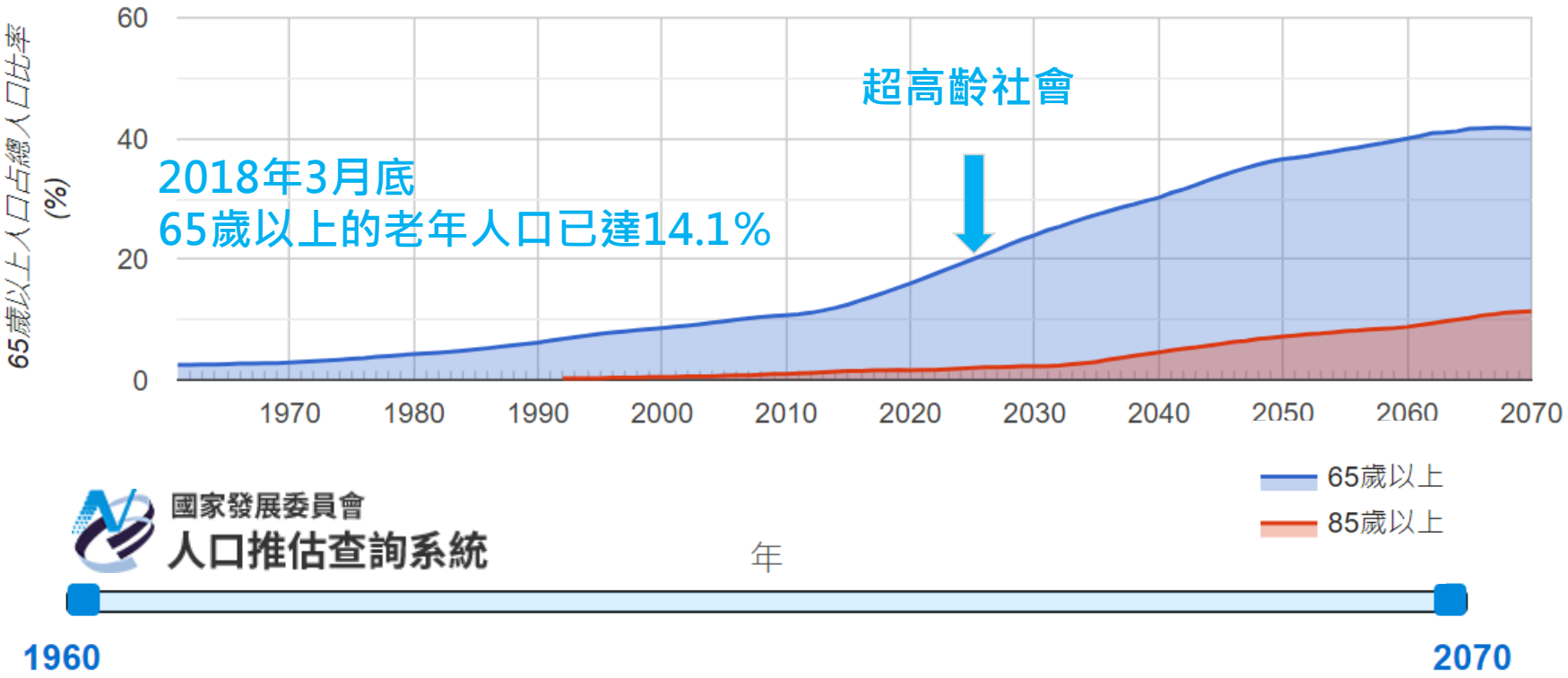
奇美醫院老年科醫師蔡岡廷指該院
合門診有效降低長輩多科就診與重
藥的問題。（記者王俊忠攝）

除了王翁，家住南市白河區
元，因看科診較多，每月需
合門診看診，整合門診把潛
個月多次奔波，

老人1天竟吃30顆藥 藥師嚇到減剩5顆

2017-11-15 16:05 聯合晚報 羅真、李樹人、謝蕙蓮 、侯廣瑜、林鎮西、蔡佩芸／製作

台灣老化進行式

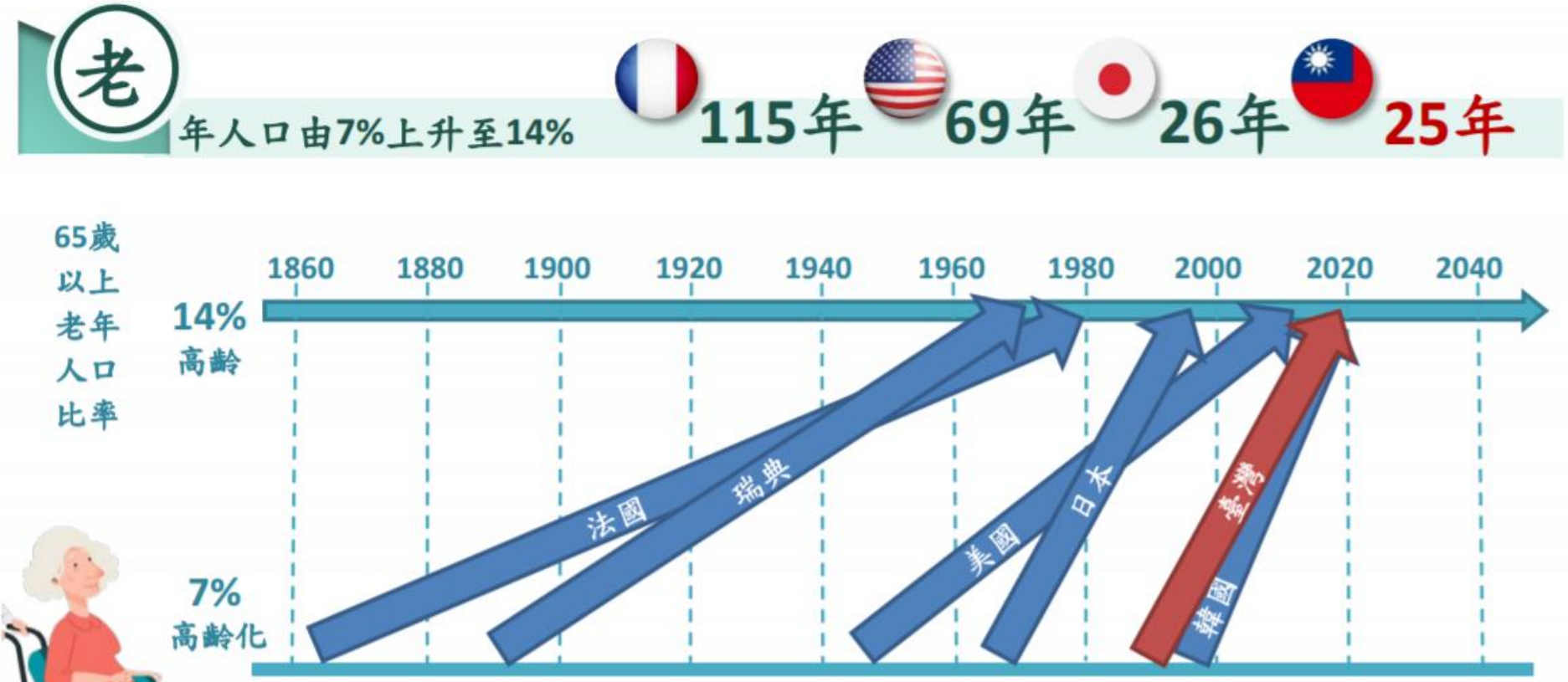


1.我國已於1993年成為高齡化社會，2018年轉為高齡社會，推估將於2025年邁入超高齡社會。

2.老年人口年齡結構快速高齡化，2020年超高齡（85歲以上）人口占老年人口10.3%，2070年增長至27.4%。

3.國際上將65歲以上人口占總人口比率達到7%、14%及20%，分別稱為高齡化社會、高齡社會及超高齡社會。

台灣高齡化速度全球數一數二



National Institute on Aging and US Census Bureau，An Aging World: 2008

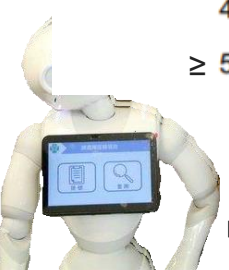
國家發展委員會 「中華民國人口推估(2018至2065年)」

老年人慢性疾病盛行率調查

106年罹患慢性病患者人數分析

慢性病個數	人數（千人）	占率
合計	6,289	100%
1 種	2,127	34%
2 種	2,013	32%
3 種	1,200	19%
4 種	578	9%
≥ 5 種	371	6%
未滿65歲	2,429	100%
1 種	561	23%
2 種	740	30%
3 種	564	23%
4 種	323	13%
≥ 5 種	242	10%

慢性病個數	人數（千人）	占率
65歲以上	3,859	100%
1 種	1,566	41%
2 種	1,273	33%
3 種	636	16%
4 種	255	7%
≥ 5 種	129	3%



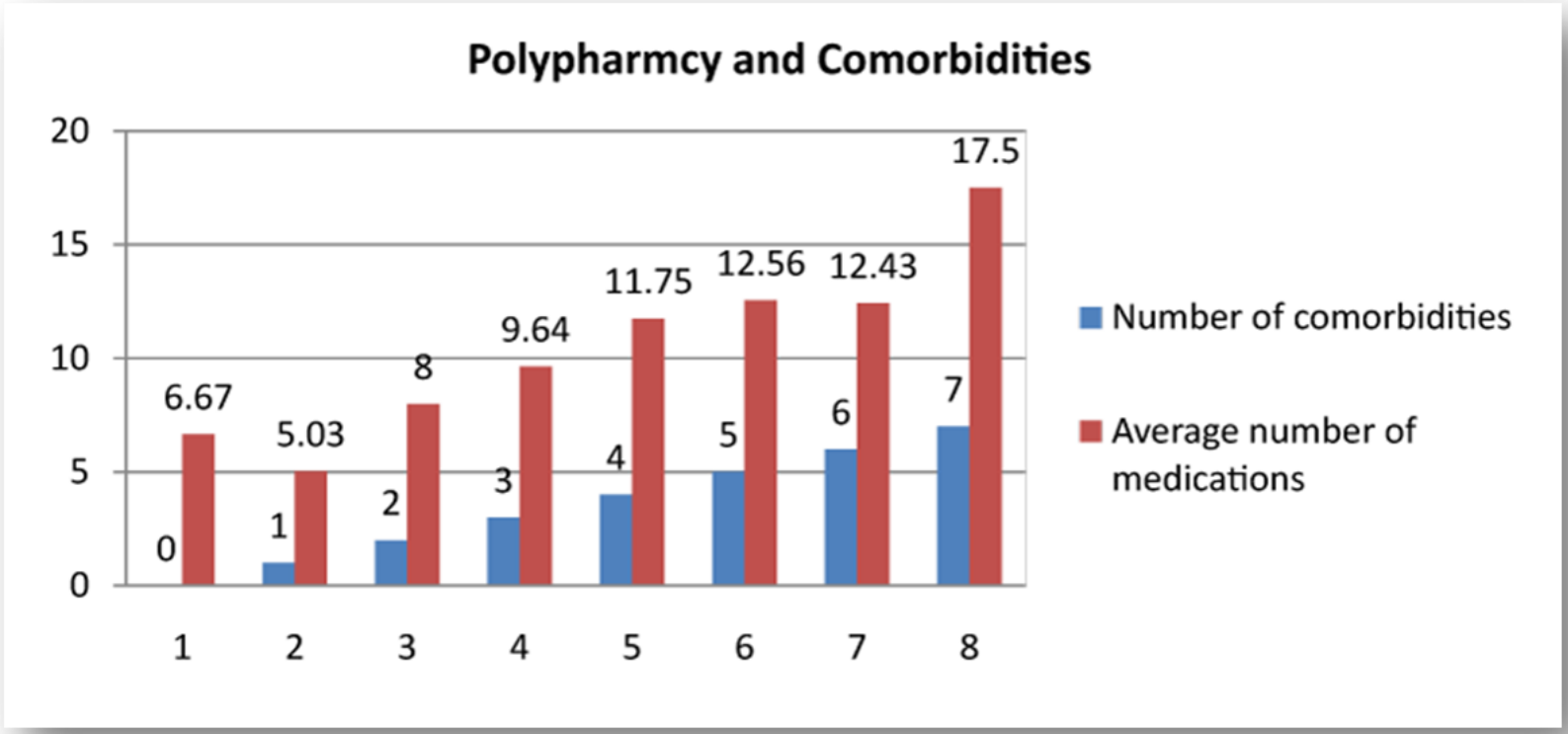
中央健康保險署

銀色風暴中的多重用藥

Preparing for the silver storm

老年人的多重用藥

共病多 藥物多



Prevalence of Poly-pharmacy in the Elderly: Implications of Age, Gender, Co-morbidities and Drug Interactions. SOJ Pharm Pharm Sci, 2014, 1(3), 1-7.

老年人多重用藥趨勢

多重用藥比例逐年增加

Table 1. Overview of studies reporting trends in polypharmacy in older adults.

Author, year of publication	Study design	Country	Study population	Source of medication data	Medication use	Polypharmacy	Time of polypharmacy assessment	Prevelence, %
Charlesworth et al. (2015) [19]	Repeated cross-sectional survey	USA	Nationally representative sample of the noninstitutionalized US population aged ≥65 years	Self-reported	All prescription drugs used in the last 30 days		1988–1991 2009–2010	12.8 39.0
Craftman et al. (2016) [24]	Repeated cross-sectional surveys	Sweden	Radom sample of the population living in one district of Stockholm aged ≥60 years	Self-reported	Current use of prescribed and over-the-counter (OTC) drugs.		1987–1989 2001–2003 2007–2009	27.0 53.9 65.3
Franchi et al. (2013)	Repeated cross-sectional register study	Italy	The population aged 65–95 years in the Lombardy region, Italy.	Routinely collected administrative data	Monthly prescription drug [illegible] year.	[illegible] drugs.	2000 2010	42.8 52.7
Haider et al. (2007)	Repeated cross-sectional survey	Sweden	Nationally representative sample of the Swedish population aged ≥77 years	Self-reported	[illegible]	≥5 drugs	1992 2002	18.0 42.0
Hovstadius et al (2010)	Repeated cross-sectional register study	Sweden	The population aged 70–79 in Sweden		[illegible] months	Use of ≥5 drugs	2005 2006 2007 2008	35.0 35.9 36.7 37.6
Kantor et al. (2015)	Repeated cross-sectional survey	USA	Nationally representative sample of the noninstitutionalized US population aged ≥65 years	Self-reported	[illegible] prescription drugs used in the last 30 days	≥5 drugs	1999–2000 2011–2012	24.0 39.0
Moriarty et al. (2015)	Repeated cross-sectional register study	Ireland	The population aged ≥65 in one health region in Ireland	Routinely collected administrative data	Prescription drugs dispensed for ≥3 consecutive months in a year (regularly used drugs)	≥5 drugs (regularly used)	1997 2012	17.8 60.4
Nishtala et al. (2014)	Repeated cross-sectional register study	New Zealand	The population aged ≥65 in New Zealand.	Routinely collected administrative data	Concurrent prescription drug use during 90 days	≥5 drugs concurrently for ≥90 days	2005 2013	23.4 29.5
Qato (2016) et al	Cohort study	USA	National representative sample of community dwellers in the US population aged 62 to 85 years	Self-reported	Current use of prescribed and OTC drugs.	≥5 drugs (only prescription drugs)	2005–2006 2010–2011	30.6 35.8
Wastesson et al. (2016)	Repeated cross-sectional register study	Sweden	The population aged ≥65 years in Sweden	Routinely collected administrative data	One-day point prevalence based on prescribed drugs during three months	≥5 drugs	2006 2013	33.7 34.8

USA

Italy

Ireland

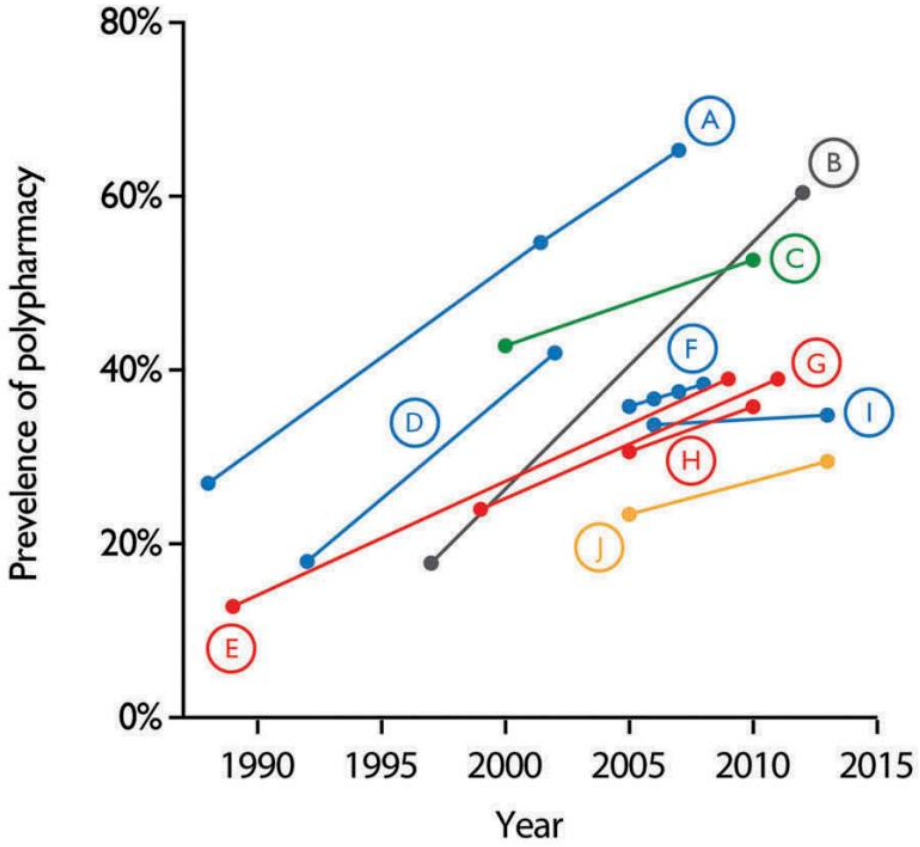
Sweden

New Zealand

Prevalence of Poly-pharmacy in the Elderly: Implications of Age, Gender, Co-morbidities and Drug Interactions. SOJ Pharm Pharm Sci, 1(3), 1-7.

老年人多重用藥趨勢

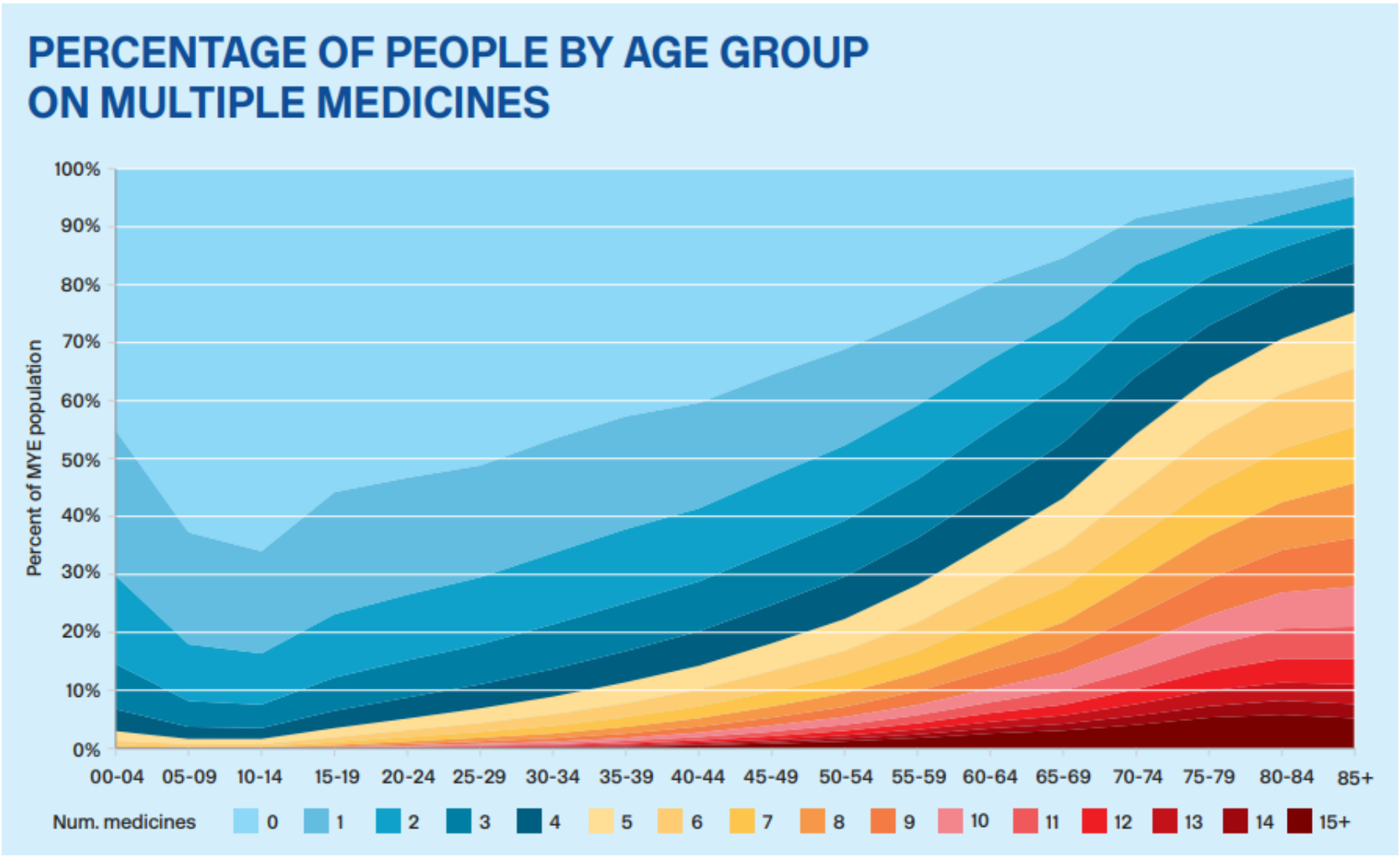
多重用藥比例逐年增加



A Craftman et al., Sweden
B Moriarty et al., Ireland
C Franchi et al., Italy
D Haider et al., Sweden
E Charlesworth et al., United States
F Hovstadius et al., Sweden
G Kantor et al., United States
H Qato et al., United States
I Wastesson et al., Sweden
J Nishtala et al., New Zealand

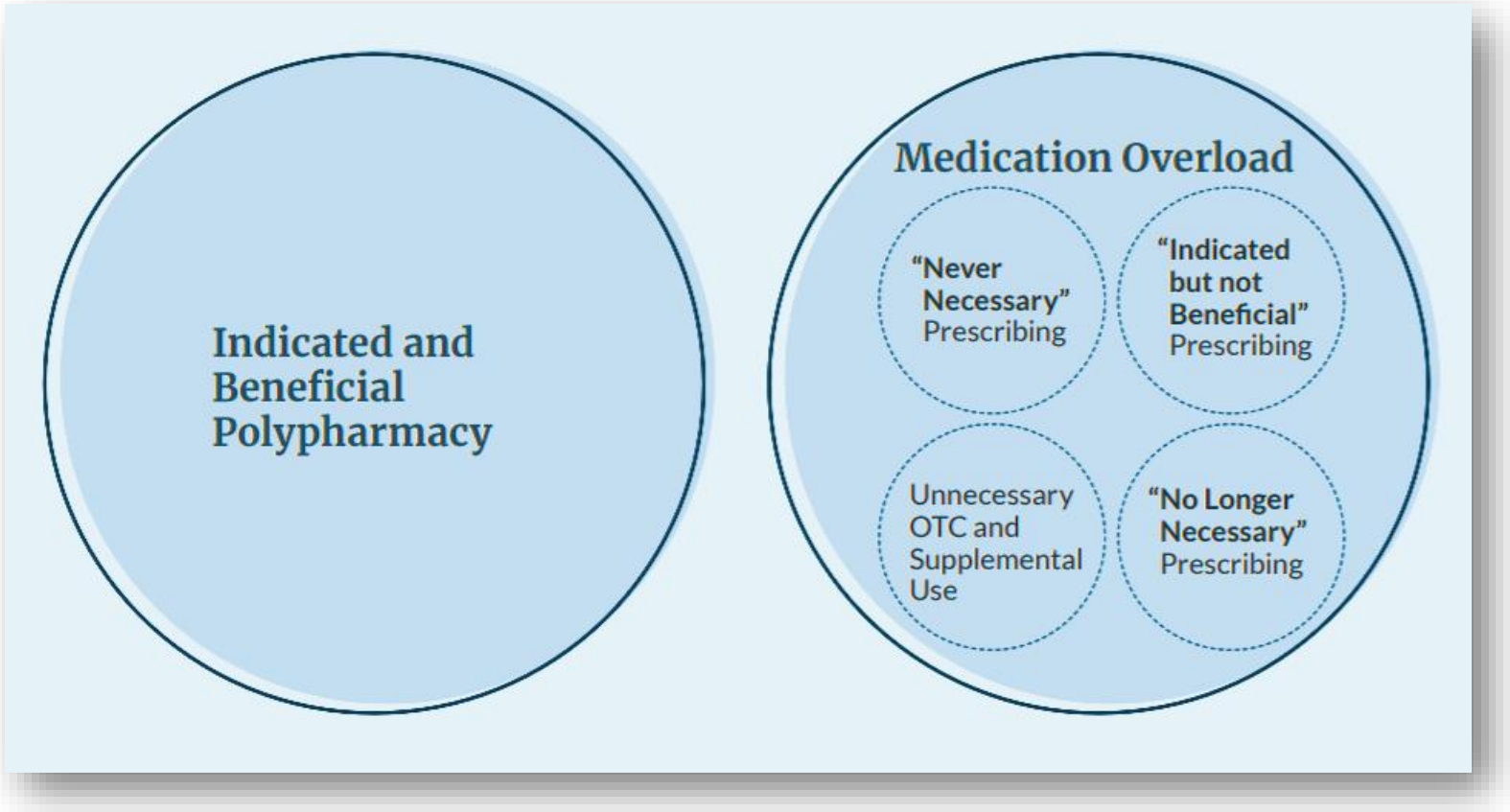
Jonas W. Wastesson, Lucas Morin, Edwin C.K. Tan & Kristina Johnell (2018) An update on the clinical consequences of polypharmacy in older adults: a narrative review, Expert Opinion on Drug Safety, 17:12, 1185-1196

PERCENTAGE OF PEOPLE BY AGE GROUP ON MULTIPLE MEDICINES



Polypharmacy Management by 2030: a patient safety challenge,. 2nd edition.

多多益善?過猶不及?


Indicated and Beneficial Polypharmacy
Medication Overload
"Never Necessary" Prescribing
"Indicated but not Beneficial" Prescribing
Unnecessary OTC and Supplemental Use
"No Longer Necessary" Prescribing

Polypharmacy vs. Medication overload

Polypharmacy

A term used in the scientific literature to describe the condition of taking multiple medications. Usually the threshold for polypharmacy is **five or more medications**, although the cutoff varies because there is not a single agreed upon definition. Polypharmacy can be helpful or harmful, depending on the patient's conditions and the specific medications.

Medication overload

The use of multiple medications for which **the harm to the patient outweighs the benefit**. There is no strict cutoff for when the number of medications becomes harmful, but the greater number of medications a person is taking, the greater their likelihood of experiencing harm, including serious adverse drug events.

Drug-disease and drug-drug interactions: systematic examination of recommendations in 12 UK national clinical guidelines

Siobhan Dumbreck,[1] Angela Flynn,[1] Moray Nairn,[2] Martin Wilson,[3] Shaun Treweek,[4] Stewart W Mercer,[5] Phil Alderson,[6] Alex Thompson,[7] Katherine Payne,[7] Bruce Guthrie[1]

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Additional material is published online only. To view please visit the journal online (http://dx.doi.org/10.1136/BMJ.h949)

Cite this as: *BMJ* 2015;350:h949
doi:10.1136/bmj.h949

Accepted: 12 January 2015

ABSTRACT

OBJECTIVE

To identify the number of drug-disease and drug-drug interactions for exemplar index conditions within National Institute of Health and Care Excellence (NICE) clinical guidelines.

DESIGN

Systematic identification, quantification, and classification of potentially serious drug-disease and drug-drug interactions for drugs recommended by NICE clinical guidelines for type 2 diabetes, heart failure, and depression in relation to 11 other common conditions and guidelines for th

SETTING

NICE clinical gui failure, and dep

MAIN OUTCOME

Potentially serio interactions.

RESULTS

Following recom national clinical potentially serio potentially serio drugs recommer and the 11 other

recommended in the guideline for depression and 10 for drugs recommended in the guideline for heart failure. Of these drug-disease interactions, 27 (84%) in the type 2 diabetes guideline and all of those in the two other guidelines were between the recommended drug and chronic kidney disease. More potentially serious drug-drug interactions were identified between drugs recommended by guidelines for each of the three index conditions and drugs recommended by the guidelines for the 11 other conditions: 133 drug-drug interactions for drugs recommended in the type 2 diabetes guideline, 89 for depression, and 111 for heart failure.

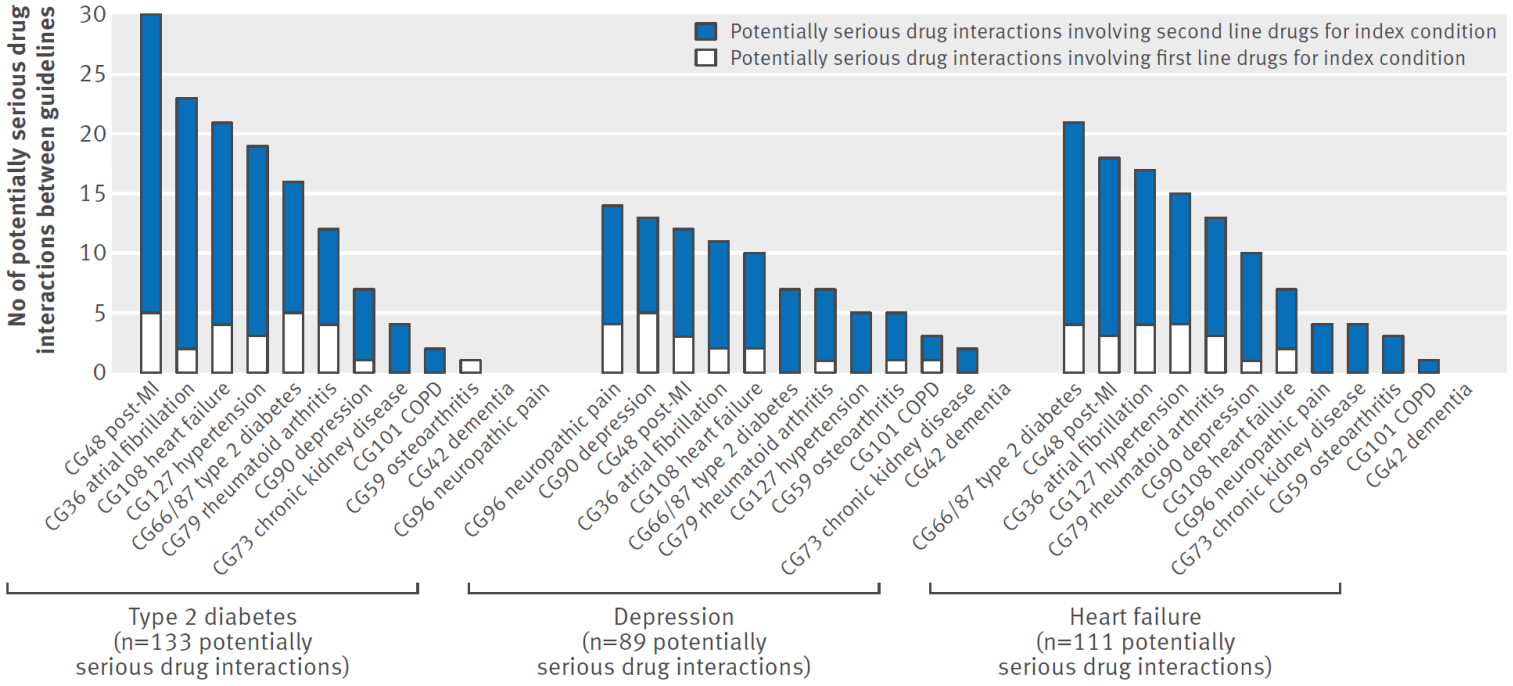


Fig 2 | Potentially serious drug-drug interactions between drugs recommended by clinical guidelines for three index conditions and drugs recommended by each of other 11 other guidelines

WHAT IS ALREADY KNOWN ON THIS TOI

There is increasing recognition that clinical gu patients with multimorbidity

Many guidelines recommend drug treatments consider drug-disease or drug-drug interactio

WHAT THIS STUDY ADDS

For the 12 guidelines examined, drug-disease un on, with the exception of interaction ey disease

erious drug-drug interactions we both how commonly different rity of the harm caused b

eed to more explicitly people with multimorbidity and should use e to identify when interactions are likely to be common and erious h to re re specific mention in a guideline.

Guid are currently limited by the use of paper based guidelines.

guidelines of course are not intended to be completely comprehensive guides to practice, in that clinicians are expected to use their judgment in deciding which treatments are appropriate in individual patients. There is, however, increasing recognition that clinical guidelines

多重用藥對老年人的負面效應

老年人的生理功能改變

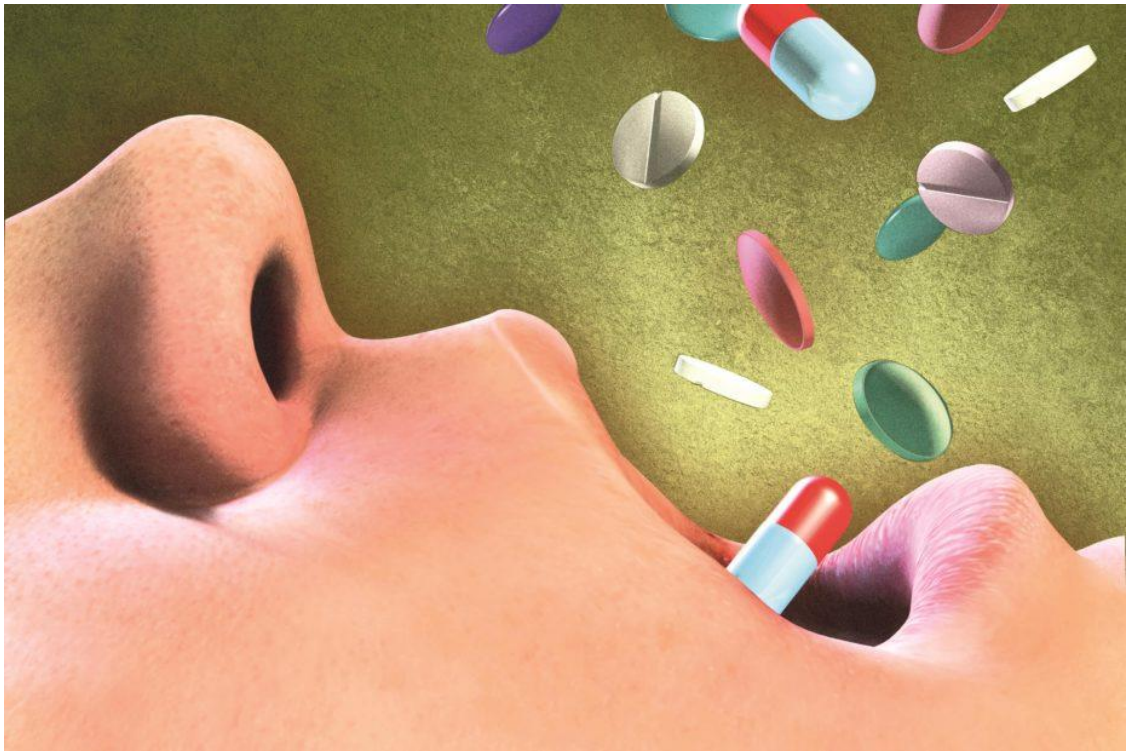
- Less Water
- More Fat
- Less muscle mass
- Slowed hepatic metabolism
- Decreased renal excretion

Pharmacokinetic Changes in Older Adults

PARAMETER	CHANGE	COMMENTS
ABSORPTION		
Gastric pH	↑	Net absorption may be increased or decreased.
Gastric emptying	↓	Peak effect will likely be delayed.
Splanchnic blood flow	↓	The intravenous route is preferred in the ED for rapid and predictable effect
Bowel motility	↓	
Absorptive capacity		
DISTRIBUTION		
Adipose tissue	↑	Lipophilic medications will accumulate with repeated dosing, which increases duration of effect.
Total body water	↓	Hydrophilic medications will have a lower volume of distribution, requiring lower loading doses.
METABOLISM		
Phase 1 metabolism	↓	Medications with phase 1 metabolism are more likely to accumulate than those metabolized via phase 2 pathways.
Phase 2 metabolism	↔	
Liver blood flow	↓	
ELIMINATION		
Glomerular filtration rate	↓	This is the most important consideration for drug dosing. Calculate creatinine clearance using the equations in Box 185.1 and adjust dosing. First doses of antibiotics and most one-time doses do not require adjustment.

Adverse Drug events

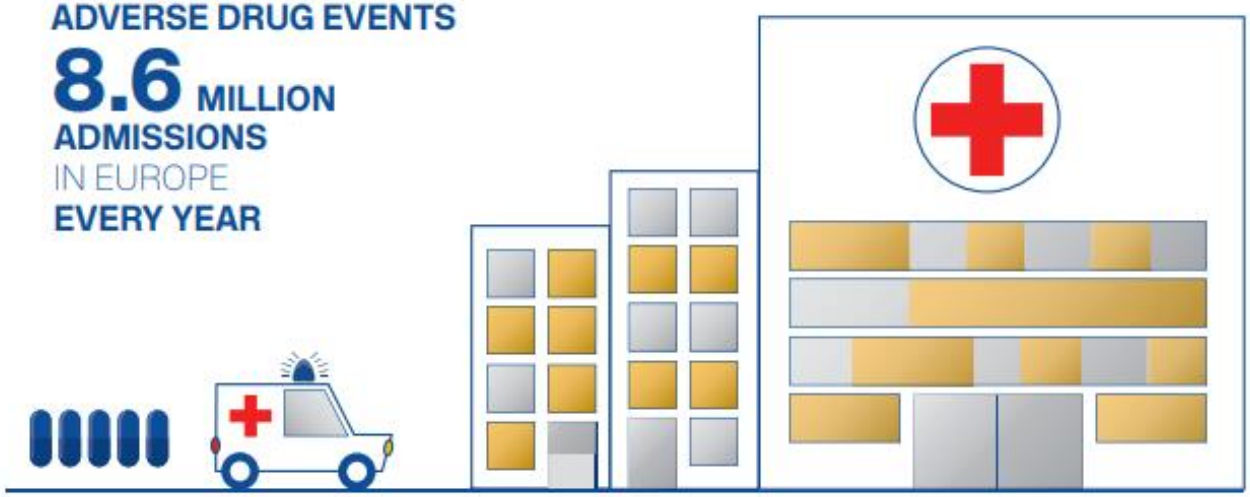
- The risk of an adverse drug event increases by 7–10% with each medication.



. New England Journal of Medicine 2003; April 2017(348).

UNPLANNED **HOSPITAL ADMISSIONS** CAUSED BY **ADVERSE DRUG EVENTS**

8.6 MILLION ADMISSIONS IN EUROPE **EVERY YEAR**



50% OF **HOSPITAL ADMISSIONS** DUE TO **ADVERSE DRUG EVENTS ARE PREVENTABLE**

70% OF **THESE ARE**

IN PATIENTS **OVER 65** YEARS OF **AGE**

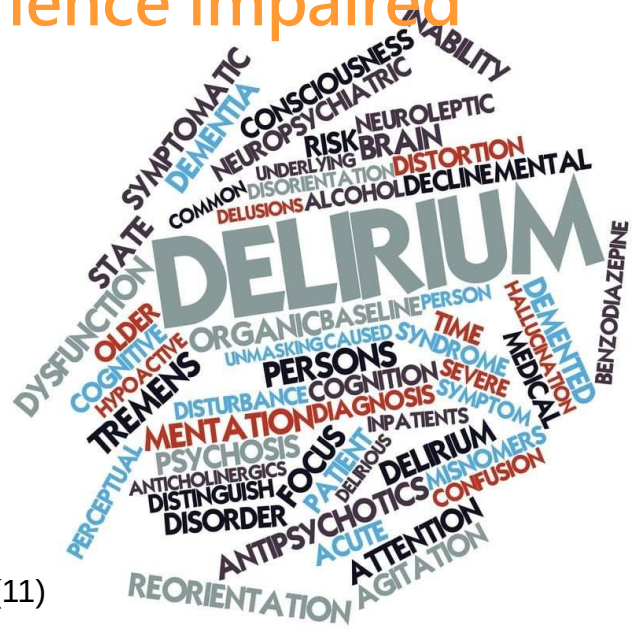
AND

ON **5 OR MORE MEDICINES**

Polypharmacy Management by 2030: a patient safety challenge,. 2nd edition.

Delirium

- Older patients **taking 6 or more drugs** in the hospital are **more than twice** as likely to **experience delirium** compared to patients taking fewer drugs.
- Older people taking **more than 10 drugs** are nearly **2.5 times more likely** than those taking fewer than 5 drugs to **experience impaired cognition**.



Journal of the American Medical Directors Association 2014; 15(11)
Expert opinion on drug safety 2014; 13(1): 57-65.

Falls

- For older adults, taking **4 or more drugs** is associated with an **18 percent greater risk of falls**.
- Taking **10 or more drugs** is associated with a **50 percent higher risk of falls**.

BMJ open 2017; 7(10).

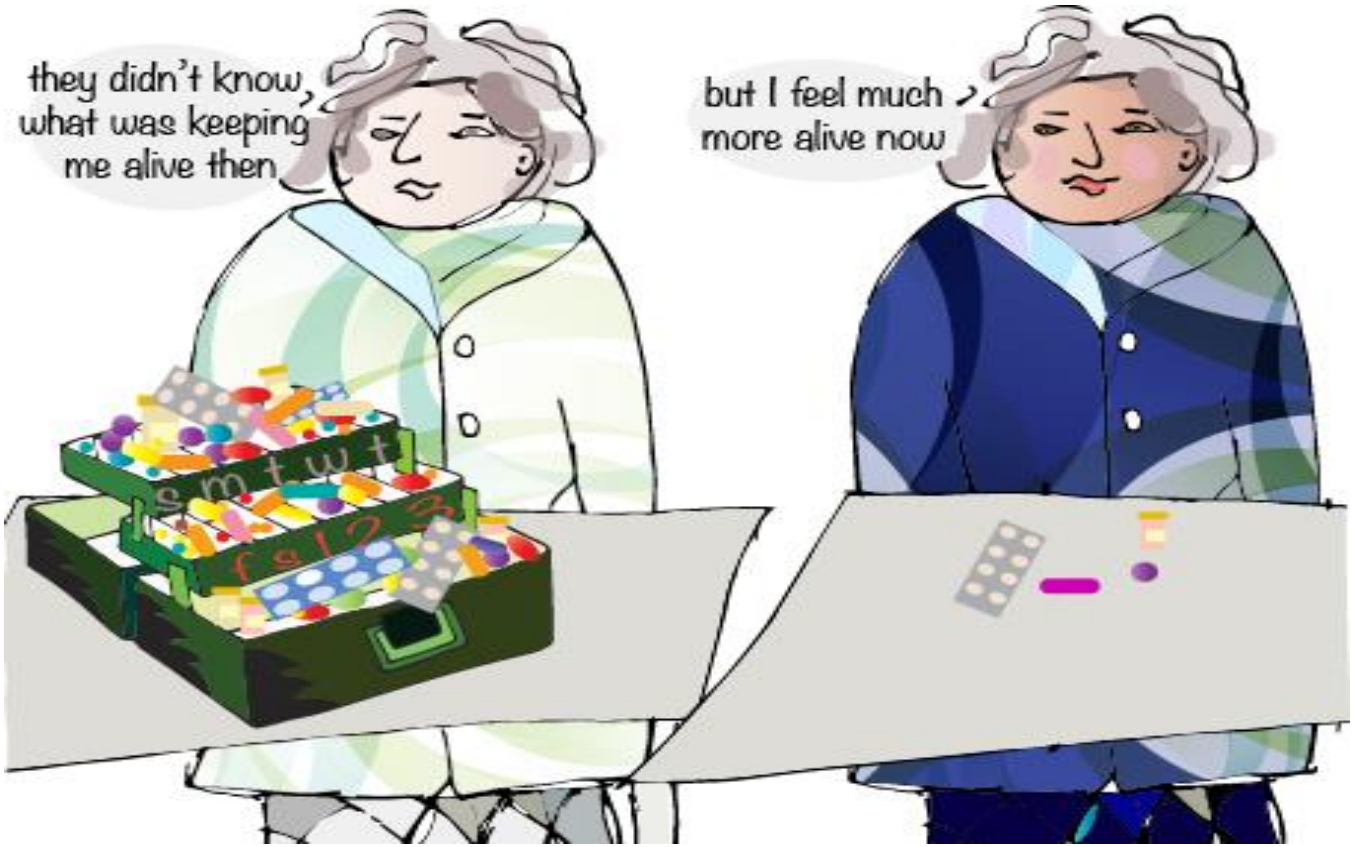
Mortality

- For older adults, taking **6 to 9 medications** is associated with a **59 percent greater chance** of death compared to taking no medications.
- Taking **10 or more medications** is associated with a **96 percent greater chance** of death.

Journal of the American Pharmacists Association: JAPhA 2017; 57(6): 729-38.e10

Drug burden

Drug burden


they didn't know, what was keeping me alive then
but I feel much more alive now
s m t w t f s

老人多重用藥的負面效應

Author, year	Topic	No. of included studies	Exposure/interventions	Outcomes	Summary of results	Comments
Fried, 2014 [17]	The relationship between polypharmacy and negative health outcomes	50	Polypharmacy	-Falls or fall-related outcomes -Adverse drug events -Hospitalization or mortality -Other outcomes	Mixed results for the association between polypharmacy and negative health outcomes.	The authors note the heterogeneity in the definitions of polypharmacy and the inadequate adjustment for chronic conditions in many studies.
Gutiérrez-Valencia, 2018 [15]	The relationship between polypharmacy and frailty	25	Polypharmacy	Frailty	A positive association between polypharmacy and frailty was found in 21 out of the 25 studies.	A majority of the included studies were cross-sectional, thus the directionality of the association could not be established.
Leelakanok, 2017 [16]	The relationship between polypharmacy and mortality	47	Polypharmacy	Mortality	Pooled estimate suggested a positive association between both the continuous number of drugs and different polypharmacy cut-offs and mortality.	The authors conclude that unmeasured/residual confounding from multimorbidity could affect the pooled estimates.
Maher, 2014 [18]	The relationship between polypharmacy and clinical consequences	≈50	Polypharmacy	-Health-care costs -Adverse drug events -Drug interactions -Medication nonadherence -Functional status -Cognitive impairment -Falls -Urinary incontinence -Nutrition - Potentially inappropriate prescribing	The review finds support for a strong association between polypharmacy and a broad range of consequences.	Polypharmacy is a growing concern as the prevalence is increasing, and varies across studies and settings. The authors urge for more interventions to reduce polypharmacy.

ADE

Falls

Hospitalization

Mortality

Health-care costs
Drug interactions
Medication –nonadherence
Functional status
Cognitive impairment
Urinary incontinence
Nutrition
Potentially inappropriate prescribing

Jonas W. Wastesson, Lucas Morin, Edwin C.K. Tan & Kristina Johnell (2018) An update on the clinical consequences of polypharmacy in older adults: a narrative review, Expert Opinion on Drug Safety, 17:12, 1185-1196

Medications Most Likely to Cause Harm

- Three classes of drugs contribute to **60 percent of emergency room visits** for adverse drug reactions among older adults

Diabetes Medications

Blood thinners

Opioids

Medications Most Likely to Cause Harm

- Other classes of drugs that increase the potential for harmful side effects.

Sedative Hypnotics

Blood Pressure Medication

Antipsychotic Drugs

Over-the Counter Drugs

What if we could reduce ADEs by 50%?

Prevents 2.3 million hospitalizations

Saves 74,000 lives

↓50 % ADEs In USA 2020-2030

Saves $30B

Eliminate 37 million outpatient visits

Prescribing Cascade

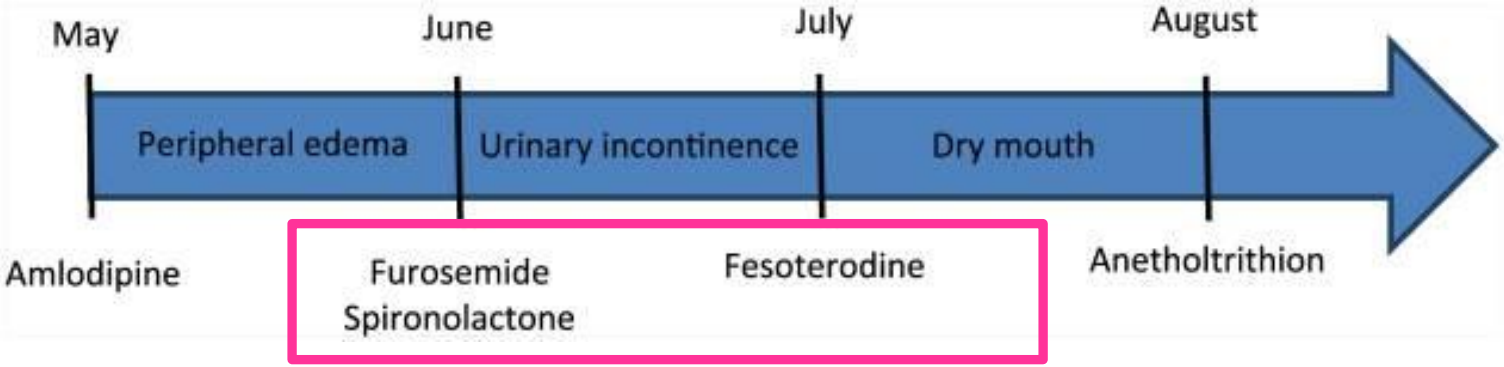
Initial Medication	Adverse Effect	Subsequent Medication
Donepezil, rivastigmine, Galantamine	Urinary incontinence	Antimuscarinic agent (eg, oxybutinin, tolterodine, solifenacin, etc[1,24])
Antimuscarinic agents, Vasodilators, diuretics, calcium channel blockers, β-blockers, ACE inhibitors, NSAIDs, opioid analgesics, sedatives, statins	Dizziness	Meclizine[24]
NSAIDs	Hypertension	Antihypertensive[24]
Amlodipine	Edema	Furosemide[1]
Thiazide diuretics	Gout	Allopurinol or colchicine[24]
Antipsychotics	EPS	Carbidopa/levodopa[24]
Digoxin, opioids, NSAIDs, nitrates, ACE inhibitors, diuretics, oral corticosteroids	Nausea	Prochlorperazine, proton pump inhibitor[24]
Memantine, rivastigmine, etc	Agitation	Antipsychotic, sedative/hypnotic[25]
Amitriptyline	Urinary retention	Tamulosin[26]

Tips for Deprescribingin the Nursing Home. *Ann. Long-Term Care24,26–32 (2016).*

Prescribing Cascade

- A 71-year-old, 68.4 kg Caucasian woman with high blood pressure, type 2 diabetes, asthma, hypothyroidism, depression, osteoarthritis and Ménières disease

metformin, fenofibrate, clopidogrel, rabeprazole, levothyroxine, potassium citrate, **aripiprazole**, **citalopram**, **bupropion**, hydroxyzine, ibuprofen and montelukast.



Can Pharm J (Ott). 2016 May; 149(3): 122–124.

Polypharmacy

- **Common in geriatric population (≥65 years)**
  - 40% take 5-9 medications, 18% take ≥10
  - **1/5 drugs** commonly used in older people **may be inappropriate**

Hospitalization might be as an opportunity to optimize older person’s medicines.

1. Patterson, S. M. et al. in Cochrane Database of Systematic Reviews (John Wiley & Sons, Ltd, 2014).
2. Budnitz, D. S., Lovegrove, M. C., Shehab, N. & Richards, C. L. Emergency Hospitalizations for Adverse Drug Events in Older Americans. N. Engl. J. Med. 365, 2002–2012 (2011).

That’s it?

老年人周全性藥物評估

Medication Error: Case Scenario

Mrs Poly, a 65 y/o woman, came to the outpatient clinic complaining of **abdominal pain and dark stools.** She had a **heart at** three weeks ago sh **he develo** iven a **NSAID** **aspirin**, and thr **statin, enalap** pital as she de **fatigue** and **da** as having a bleed doctor **discont** **azole**.

Mair A. *Medication safety in polypharmacy. Third Global Patient Safety Challenge flagship report*. 2019. Geneva: World Health Organization, 2019.

Medication Error: Case Scenario

Following her discharge, her son collected her prescribed medicines from the pharmacy. Among the medicines, he noticed **that omeprazole had been started and that all her previous medicines had been dispensed**, **including the NSAID**. As his mother was slightly confused and could not remember exactly what the doctor had said, **the son advised his mother that she should take all the medications that had been supplied.**

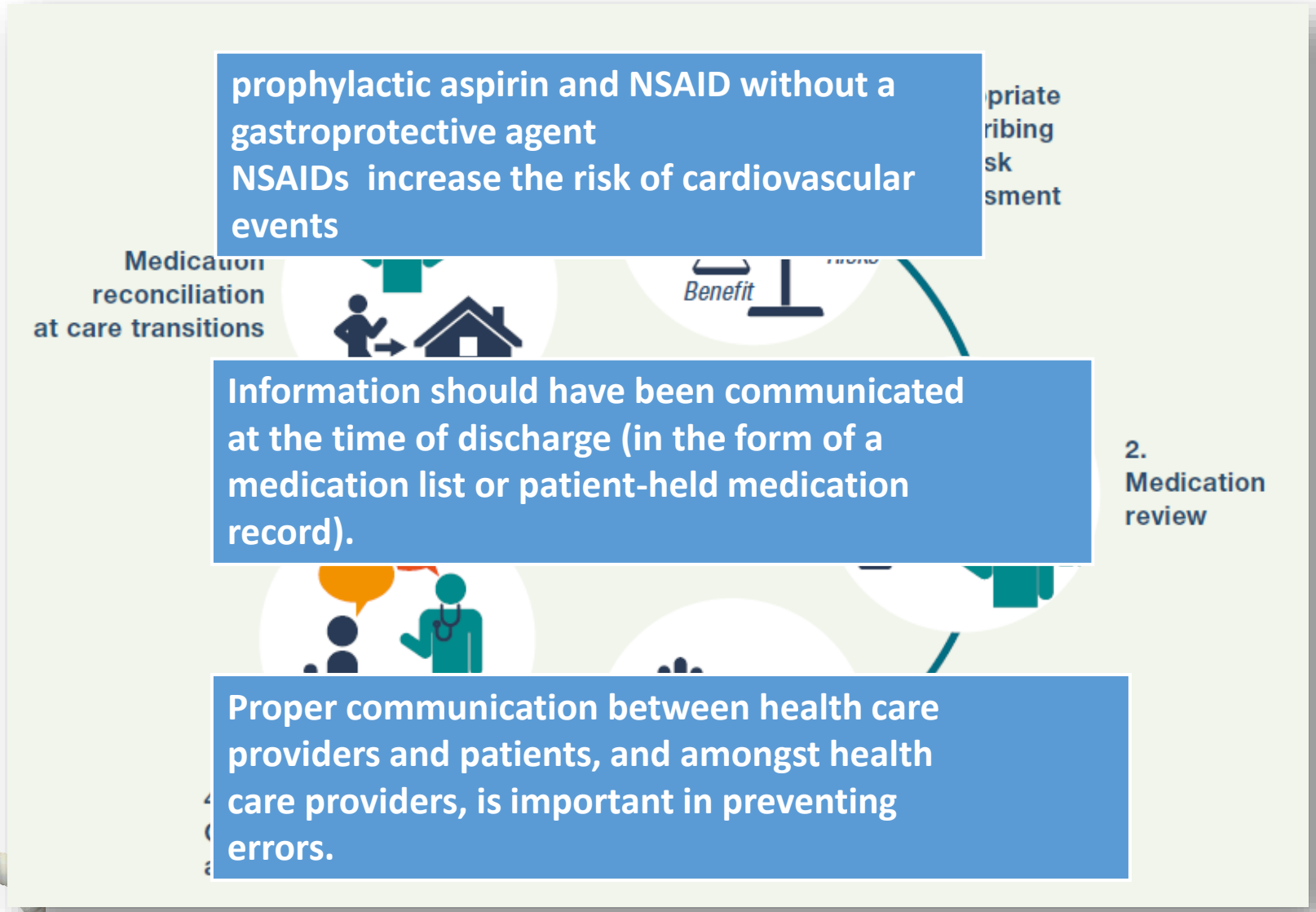
Mair A. *Medication safety in polypharmacy. Third Global Patient Safety Challenge flagship report*. 2019. Geneva: World Health Organization, 2019.

Medication Error: Case Scenario

After a week, her **abdominal pain continued** and her son took her to the hospital. **The clinic confirmed that the NSAID, which should have been discontinued (deprescribed), had been continued by mistake**.
This time Mrs Poly was given a **medication list** when she left the hospital which included all the medications she needed to take and was advised about which medications had been discontinued and why.

Mair A. *Medication safety in polypharmacy. Third Global Patient Safety Challenge flagship report*. 2019. Geneva: World Health Organization, 2019.

Key Steps for Ensuring Medication Safety

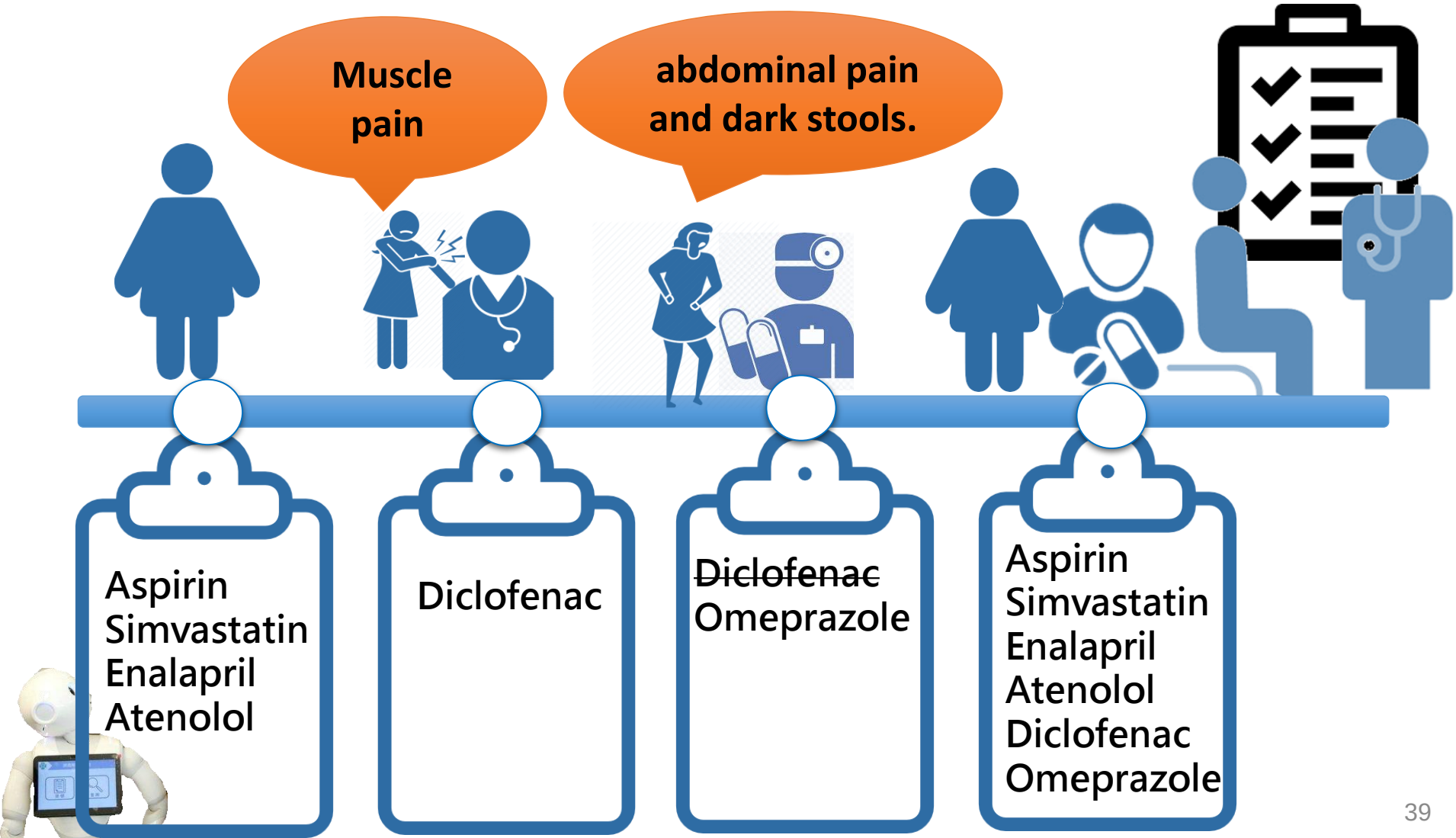


prophylactic aspirin and NSAID without a gastroprotective agent
NSAIDs increase the risk of cardiovascular events

Information should have been communicated at the time of discharge (in the form of a medication list or patient-held medication record).

Proper communication between health care providers and patients, and amongst health care providers, is important in preventing errors.

Comprehensive Medication Management



藥物整合
Medication Reconciliation

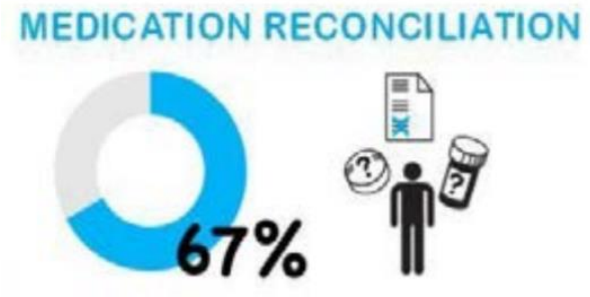
Medication reconciliation

- A formal process of **obtaining and verifying** a **complete and accurate** list of each patient's **current medicines** matching the medicines the patient should be prescribed to those they are actually prescribed.

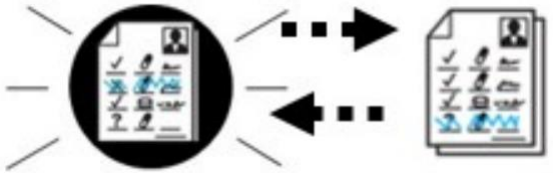
用藥連貫性

J Pharm Pract Res 2007; 37: 231-3.

Discrepancy exists



one or more errors in medication history



30 – 80% of patients have a discrepancy

- Up to **67%** of patients' prescription medication histories recorded on admission to hospital have **one or more errors** .
- **30 – 80%** of patients have a discrepancy between **the medicines** ordered in hospital and those they were taking at home.

漏開藥物
藥物劑量/劑型錯誤
重複給藥
開錯藥

Jt Comm J Qual Patient Saf. 2006;32(4):225-9.

Why is Medication Reconciliation Important?

A patient's Primidone (barbiturate for epilepsy) was **discontinued during the patient's hospitalization** and **not renewed upon discharge** to a skilled nursing facility. The patient later experienced **3 grand mal seizures** while at the skilled nursing facility."

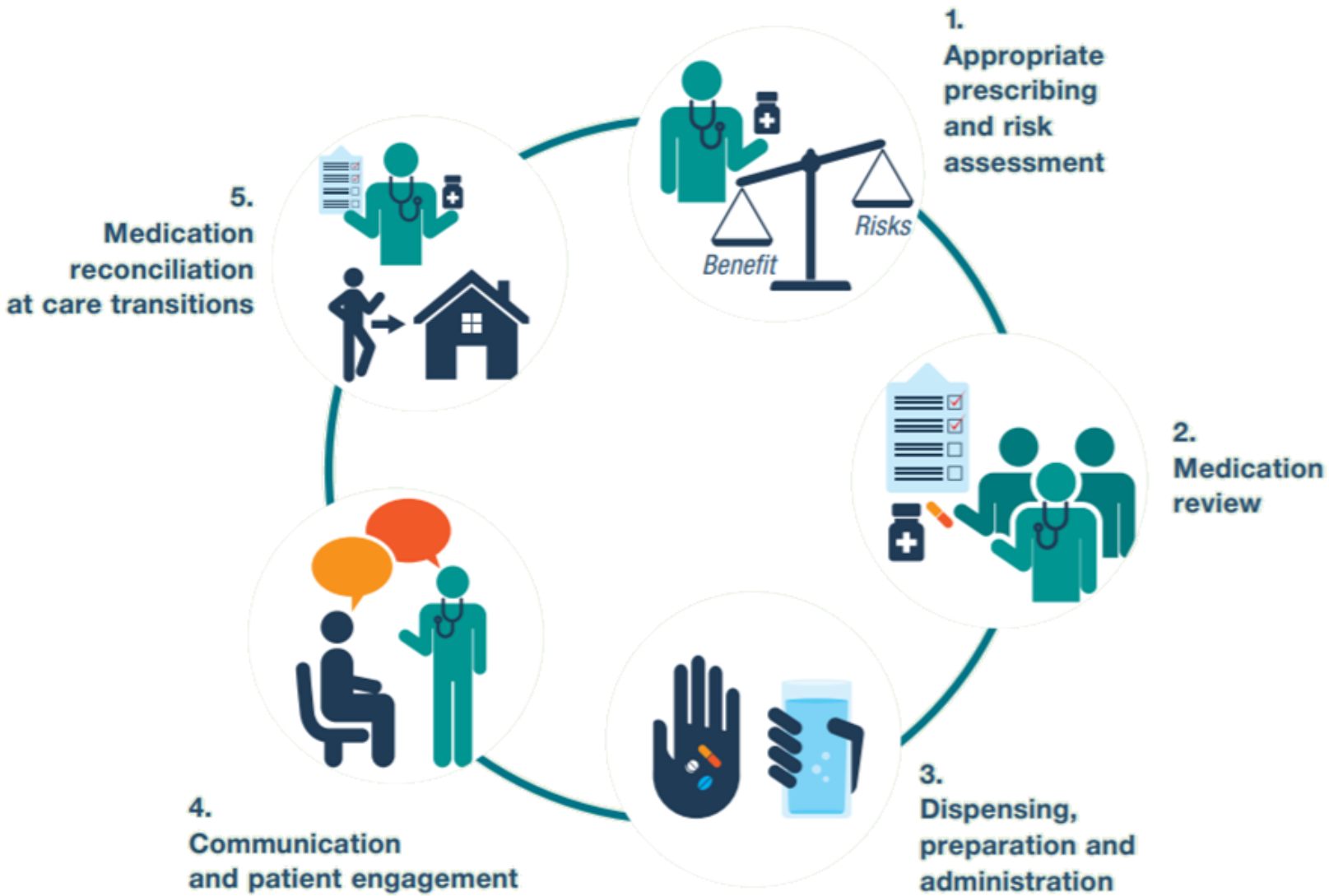
A patient was re-admitted two days after discharge with **severe hypoglycemia**. The treating **teams discharged the patient on a new insulin regimen** without realizing that The patient continued to take her previous regimen as well as the new one, **the patient also had insulin 70/30 [30/70] at home,** and was found unresponsive by her husband. The patient was in ICU with the incident likely resulting in permanent neurological deficits.

用藥連貫性

- 加拿大 Queen's University 的 Office of Interprofessional Eduation and Practice 在2009年所發布的「用藥連貫性學習指引 (Medication Reconciliation: A Learning Guide)」，用藥連貫性程序包括：
  - 獲取病人最近正規則性服用之最完整及正確的「**藥歷清單 (Best Possible Medication History；BPMH)**」、醫師參考這份清單來開立住院醫囑、轉床/轉單位/轉院醫囑或出院醫囑。
  - 比較藥歷清單與新開住院醫囑，**檢視是否有任何用藥差異**並提醒照顧病人之醫療團隊，必要時變更醫囑，並將所有變更文件化。

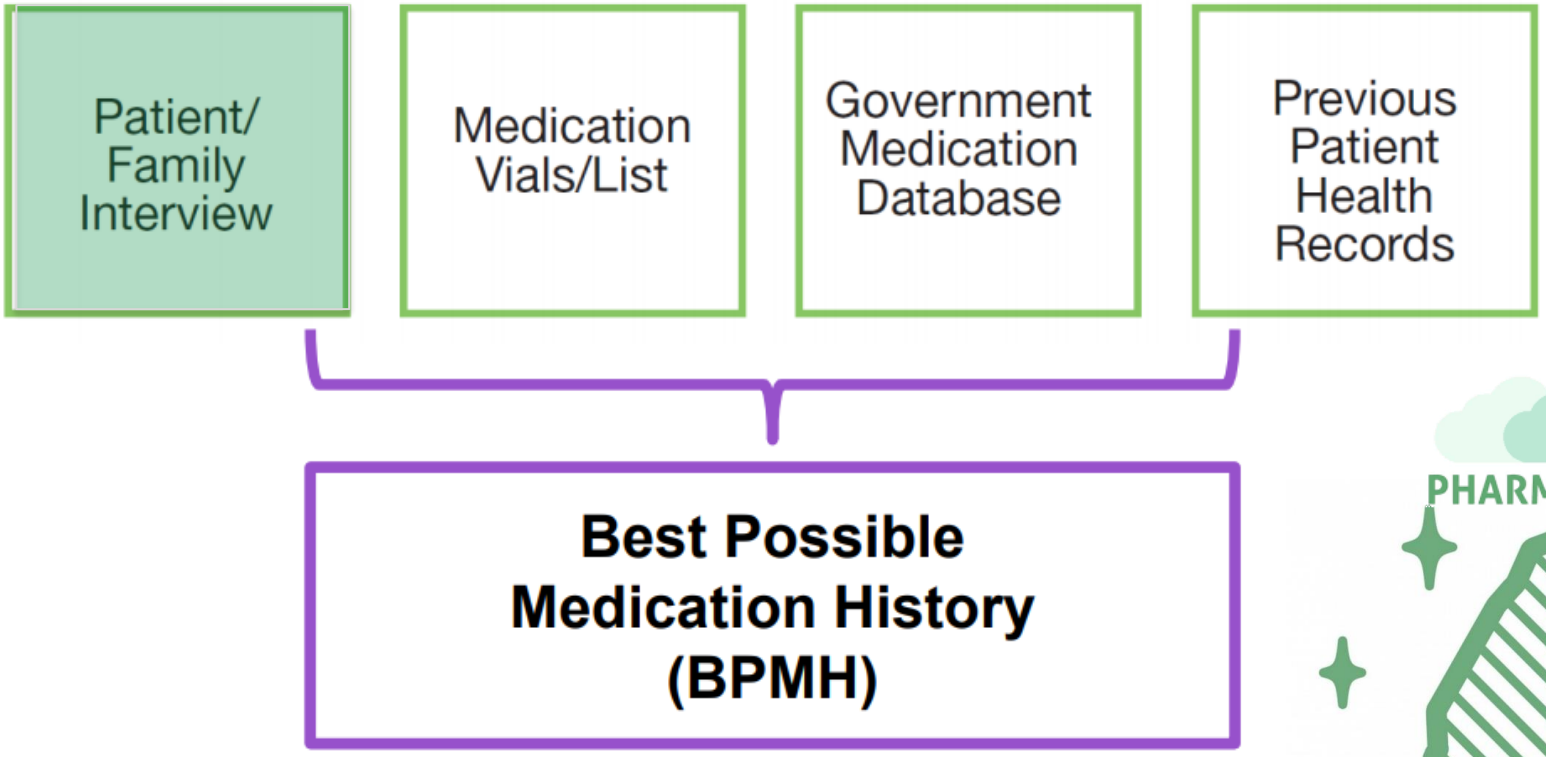
Medication Reconciliation: A Learning Guide, Retrieved on Mar. 2, 2019, from https://meds.queensu.ca/central/assets/modules/mr/

Key steps for ensuring medication safety



World Health Organization. (2019). Medication safety in polypharmacy: technical report.

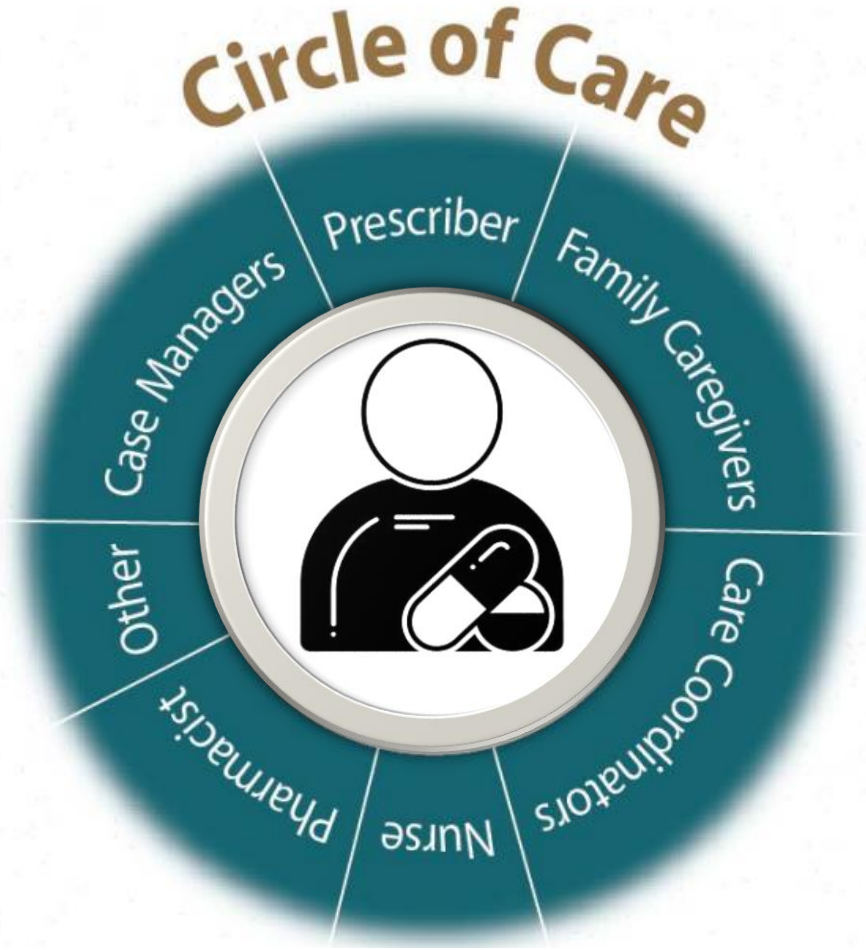
How do we get BPMH?



你覺得誰可以做藥物整合?

1. 醫師
2. 藥師
3. 護理師
4. 個管師
5. 以上稱謂有師的都可以

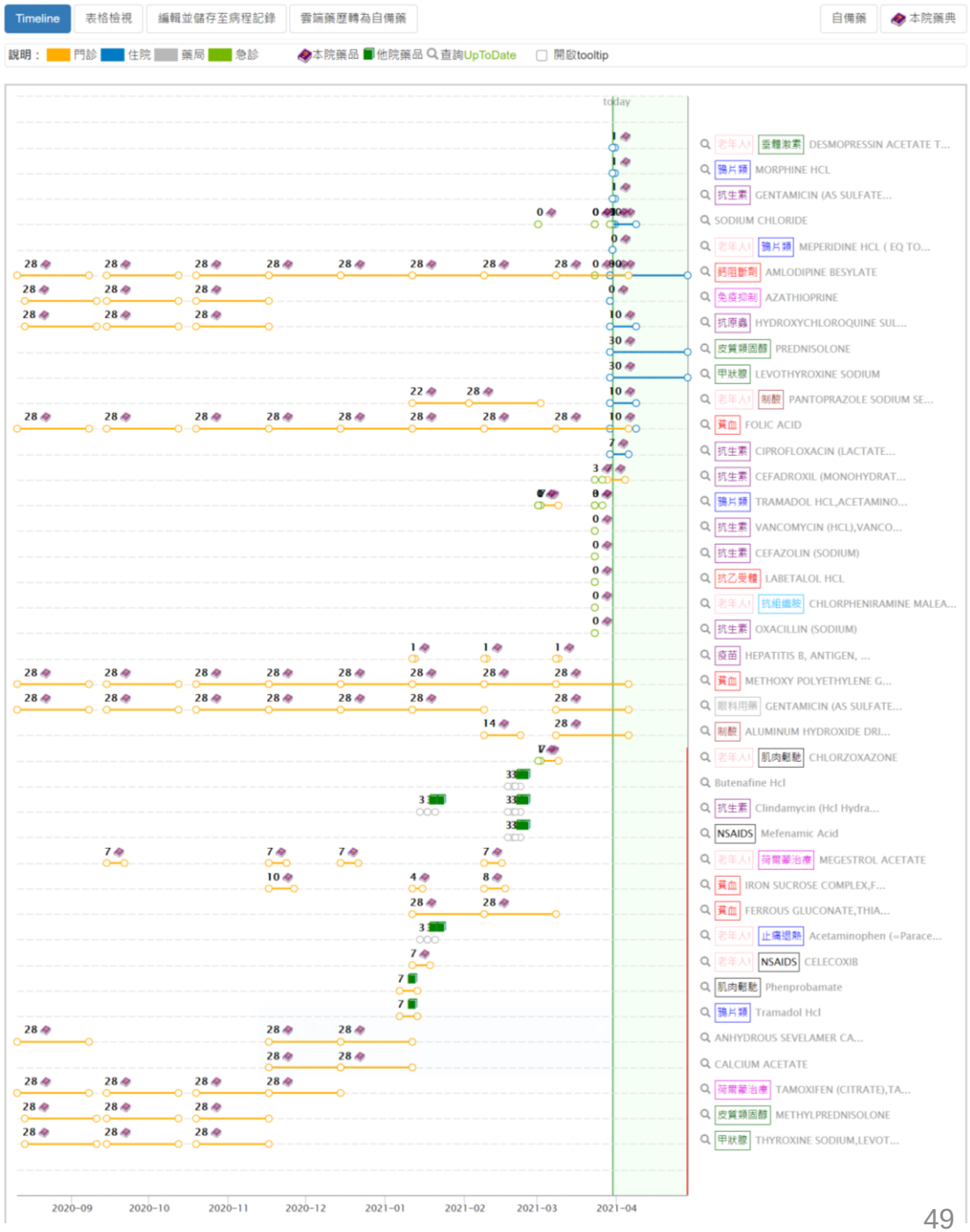
Who should be Involved in Medication Reconciliation?



Canadian Patient Safety Institute: Medication Reconciliation Home Care Getting Started Kit

全部(使用中) | STANDING | PRN | STAT | 全部(含已停用)

目前用藥醫囑	ATC	劑 量	單位	途徑	頻 次	生效
(針)Desmopressin 4mcg		4	AMP	IVA	ONCALL	110/03/31
Morphine inj 10mg 危 跌		5	MG	SC	ONCALL	110/03/31
V-Genta inj 80mg 抗		80	MG	IRR	STAT	110/03/31
N.S. inj 500ml BAG		500	ML	IVD	STAT	110/03/31
Plaquenil tab		1	TAB	PO	TIW (一三五)	110/03/30
0.05mg Eltroxin tab		4	TAB	PO	QDAC	110/03/30
Prednisolone tab 5mg		1	TAB	PO	QD	110/03/30
Pantoloc tab 40mg		1	TAB	PO	QDAC	110/03/30
Norvasc tab 5mg		1	TAB	PO	BID	110/03/30
Folic Acid tab 5mg		1	TAB	PO	QD	110/03/30
N.S. inj 500ml BAG		500	ML	IVD	QD	110/03/30
(針)Ciproxin inj 200mg 抗		1	BOT	IVD	QD	110/03/30
@自備藥 ImURan tab 50mg		2	TAB	PO	Q1W	110/03/30



病人自備藥物辨識

附件 6.1 自備藥品確認單　　**自備藥品確認單**

*為加速辨識作業，請詳細填寫**病人基本資料**及**粗黑框內項目***

病人姓名：[redacted]　床號：52-592　病歷號：[redacted]　日期：109 年 2 月 24 日

藥品來源：診所　醫師：[redacted]　護理人員：[redacted]　確認藥師：[redacted]

項次	藥品外觀	用法/用途	藥名	單位含量	確認結果	備註
1	膚色. 圓形.	利尿劑 0.5#. QD.	Amizide (Amlodipine 5mg (Hydrochlorothiazide 50mg		☐可開立自備藥 ☑本院有相同藥品，請開立醫囑 ☐本院_____可取代之，請開立醫囑 ☐不建議開立自備藥	Amizide AM720
2	白色. (CYH) (122)	精神科藥物 0.5#. HS.	Zolpidem 柔拍眠錠	10mg/tab	☐可開立自備藥 ☑本院有相同藥品，請開立醫囑 ☐本院_____可取代之，請開立醫囑 ☐不建議開立自備藥	Stilnox (Zolpidem) AZ060
3					☐☐可開立自備藥 ☐本院有相同藥品，請開立醫囑 ☐本院_____可取代之，請開立醫囑 ☐不建議開立自備藥	
4					☐可開立自備藥 ☐本院有相同藥品，請開立醫囑 ☐本院_____可取代之，請開立醫囑 ☐不建議開立自備藥	

病人家屬參與用藥整合過程

評核項目	評核內容	A 3 分	B 2 分	C 1 分	D 0 分	NA
1. 藥品管理【共 26 分】						
1.1 庫存管理 【共 2 分】	1.1.1 動員物資應有符合規定之□儲備量及□定期通報。	-	符合 2 項	符合 1 項	未符合	
1.2 推行病人用藥整合 【共 6 分】	1.2.1 訂有□推行病人用藥整合策略（Medication reconciliation）□能運用雲端藥歷，並□讓病人或家屬參與用藥整合過程(如：入院用藥史、出院用藥清單、自備藥管理辦法等。）	符合 3 項	符合 2 項	符合 1 項	未符合	
	1.2.2 利用□資訊系統建立病人藥歷，□	符合 2	符合 1	-	未符	
	反應史，並登錄於病歷首頁(含電					

病人/家屬參與
Medication Reconciliation

SWEDISH

我的用藥記錄
My Medication Record

用藥人姓名 *Medication Record for*: _____

藥房 *Pharmacy*: _____ 電話 *Telephone*: _____

緊急聯絡人姓名 Emergency Contact Name: _____ 電話 *Telephone*: _____

用藥安全提示 Medication Safety Tips

1. 為每一位家庭成員设立一個用藥記錄。並隨時攜帶你的用藥記錄。
   Create a Medication Record for every family member. Keep the records with you at all times.
2. 定期更新您的用藥記錄 -- 尤其是你開始或停止用藥的時間和日期。當你停止服用一種藥物時，在該藥名上畫線，然後寫上停止用藥的時間和日期。
   Update your Medication Record regularly — especially when you start or stop a medication. When you stop taking a medication, draw a line through it and enter the date you stopped.
3. 將用藥記錄提供給你所在的診所，醫院或急診室醫生，以供參考。
   Share your Medication Record with every doctor you see in a clinic, hospital or emergency room.
4. 當醫生給你開新藥時，應該問醫生那是什麼药？药的作用是什麼？你需要吃多長時間？藥物可能會產生什麼副作用？
   When your doctor prescribes a new medicine, ask him/her what it is, why and for how long you are to take it, and if there may be side effects.
5. 向您的藥劑師詢問該藥是否可能與你所服用的其他藥物有相反作用。
   Ask your pharmacist if there may be interactions with other medicines you take.
6. 不要服用他人的藥物，也不與任何人分享你的藥物。
   Don't take anyone else's medicine and don't share yours with anyone else.
7. 不要服用任何已经過了期的藥物。
   Don't take any medications that have expired.

處方藥和非處方藥，營養補充劑 和 維生素
Prescription and Over-the-Counter Medications, Supplements and Vitamins

(使用本表格背面继续列出其他藥物名稱) *(Use the back of this form to list additional medications)*

藥物名稱和開始日期 NAME OF DRUG AND DATE STARTED	劑量（毫克/毫升） DOSE (mg/ml)	服用方法 HOW OFTEN/WHEN DO YOU TAKE?	药物功能 WHY DO YOU TAKE IT?

Medication Management

Medication management is defined as patient-centred care to optimize safe, effective and appropriate drug therapy. Care is provided through collaboration with patients and their health care teams[1]

Clinical Medication Review

Addresses issues relating to the patient's use of medication in the context of their clinical condition in order to improve health outcomes[2]

Medication Reconciliation

A formal process in which healthcare providers work together with patients to ensure accurate and comprehensive medication information is communicated consistently across transitions of care[3]

Best Possible Medication History

A complete and accurate list of all the medications a patient is taking created using at least 2 sources of information including a client and/or family interview[4]

The four **C's**

Step 1

Collect - *Collect the Best Possible Medication History (BPMH)*

- Interview the client/family caregiver using a systematic process to determine actual medication use by the client
- Review at least one other reliable source of information to obtain and verify all of a patient's medication use (prescribed and non-prescribed)
- Document the BPMH

Step 2

Compare - *Identify discrepancies*

- Compare the BPMH with the most current information found in the client's recorded medication information sources
- Identify and document discrepancies

The four **C's**

Step 3

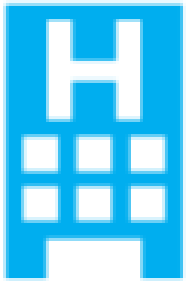
Correct - *Resolve discrepancies*

- Correct or resolve discrepancies through discussion with the client/family caregiver and/or healthcare professional(s), as appropriate, i.e., reconcile
- Update the BPMH (as needed) to accurately reflect the client's current medication regimen once discrepancies are resolved. T**his updated list becomes the reconciled medication list**
- Document the reconciled medication list in a clearly visible and accessible place

Step 4

Communicate - *the reconciled medication list*

- Communicate any medication changes to the client/family caregiver and verify their understanding of the updated medication regimen
- Provide the reconciled medication list, whenever possible, to: client/family caregiver and others involved in the client's circle of care
- Convey the importance of keeping an up-to-date medication list



Step 1 **Collect** - *Collect the Best Possible Medication History (BPMH)*

Step 2 **Compare** - *Identify discrepancies*

- **No discrepancies** → **Step 3** **Correct** - *Resolve discrepancies*: Update the BPMH to reflect client's current medication regimen once discrepancies are resolved (as needed). *RECONCILED MEDICATION LIST*
- **Discrepancies** → Identify reason for the discrepancy
  - If **not** within the healthcare providers' scope of practice, refer the discrepancy to most responsible prescriber/healthcare provider for resolution → **Step 3** **Correct** - *Resolve discrepancies*: Update the BPMH to reflect client's current medication regimen once discrepancies are resolved (as needed). *RECONCILED MEDICATION LIST*
  - **Step 3** **Correct** - *Resolve discrepancies*: If within the healthcare providers' scope of practice, resolve the discrepancy → Update the BPMH to reflect client's current medication regimen once discrepancies are resolved (as needed). *RECONCILED MEDICATION LIST*

Step 4 **Communicate** - *the reconciled medication list* within the client's circle of care

Comprehensive Medication Management

ing St, Taipei)

PROGRAM GOAL

To promote effective clinical pharmacist p

s2E6

OVERALL PROGRAM OBJECTIVE

n7

At the end of this workshop session, partic
optimal approaches to clinical pharmacy p
development, as well as application to pat

FACULTY

John M. Bu
Professor
St. Louis Co
St. Louis, M
USA

Brian A. Hemstreet, Pharm.D., FCCP, BCPS
Professor and Assistant Dean,
University of Colorado
Denver, Colorado
USA

Alan Lau, Pharm.D., FCCP
Professor and Director
International Clinical Pharmacy Education
University of Illinois at Chicago
Chicago, Illinois
USA

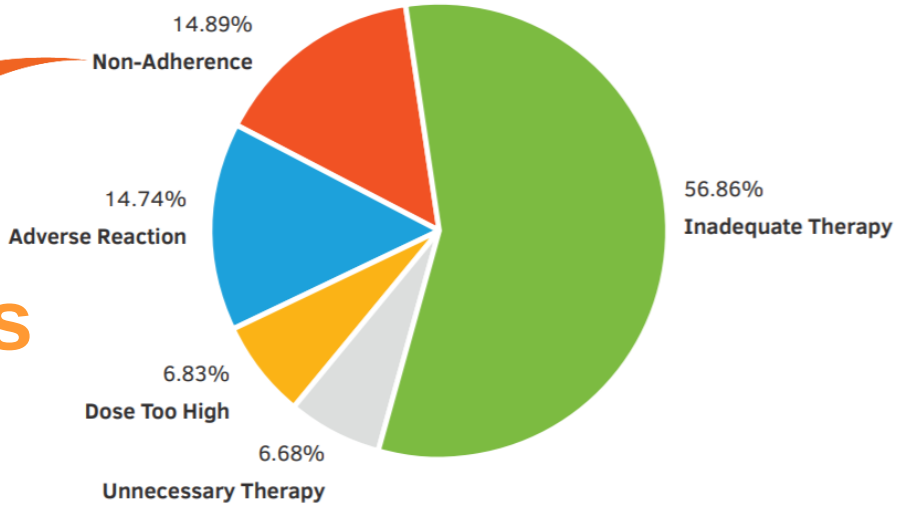
Michael Maddux, Pharm.D., FCCP
Executive Director
American College of Clinical Pharmacy
Lenexa, Kansas
USA

John M. Burke, Pharm.D., FCCP, BCPS

5:00 p.m.	**Case Applications I: Polypharmacy and Comprehensive Medication Management in the Elderly** *John M. Burke, Pharm.D., FCCP, BCPS*
6:15 p.m.	**Break**
6:30 p.m.	**Managing Gastrointestinal Disease in Older Adults** *Brian A. Hemstreet, Pharm.D., FCCP, BCPS*
7:15 p.m.	**Case Applications II: GI Problems** *Brian A. Hemstreet, Pharm.D., FCCP, BCPS*
8:00 p.m.	**Summary/Next Steps** *Michael Maddux, Pharm.D, FCCP*

Medication Therapy Problem

- Medications are involved in **80% of all treatment plans** and affect almost every aspect of a patient’ s life.
- Prescriptions dispensed in the United States are estimated to approach 5 billion by 2021.
- According to the World Health Organization, **adherence** to therapy for chronic diseases in developed countries averages **50%**.



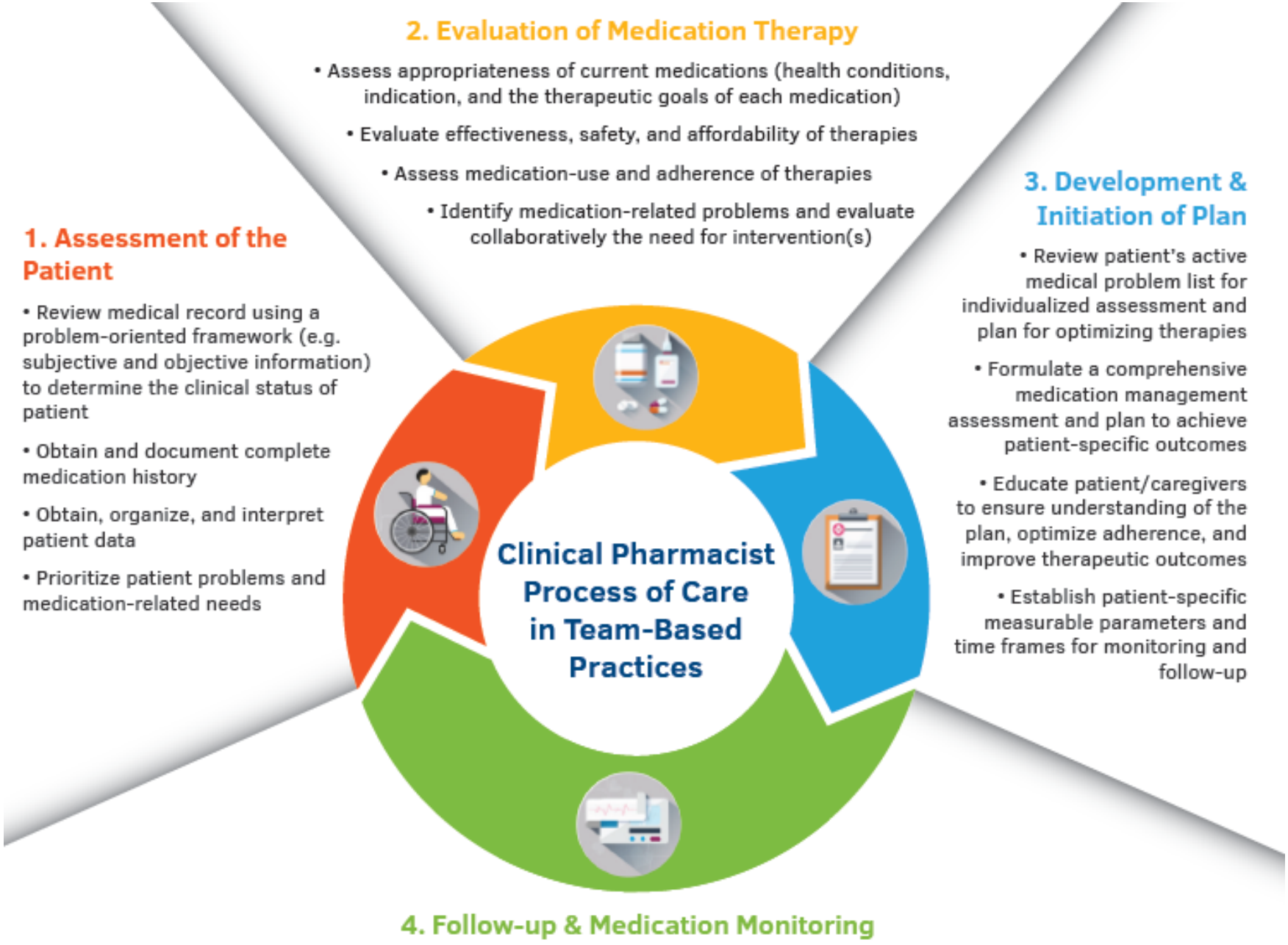
poor health outcomes

↑ health care costs

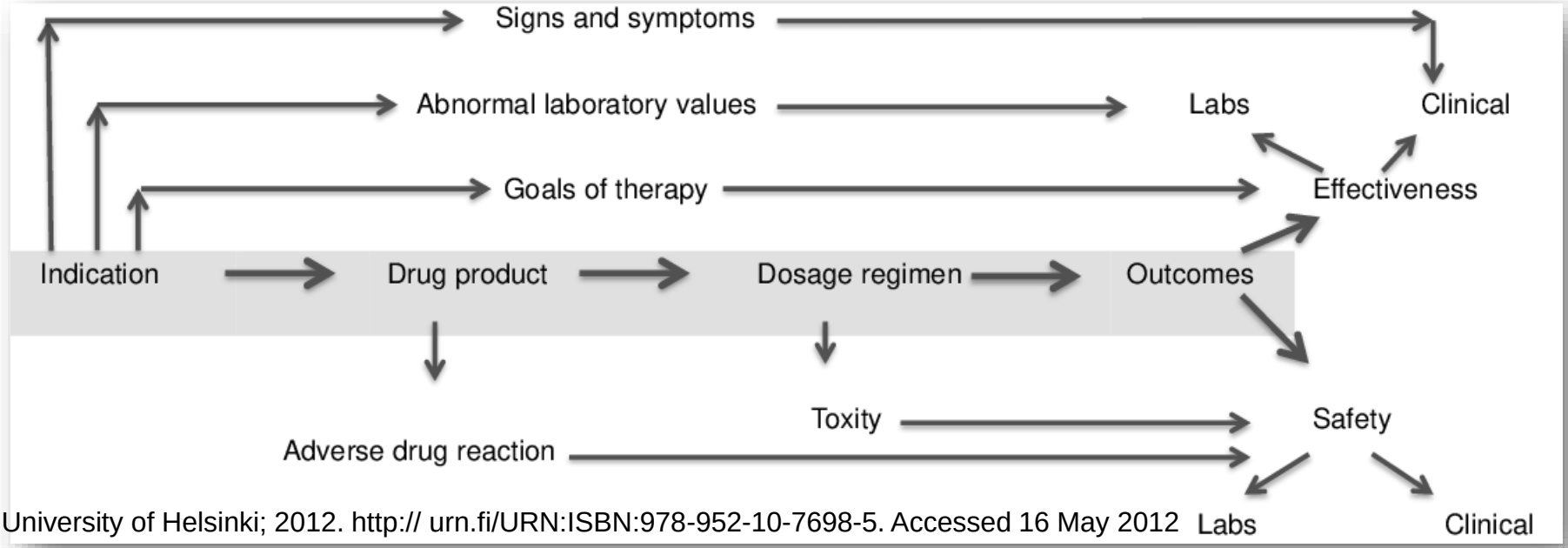
Strand, L. Written communication. October 4, 2013.

What is CMM?

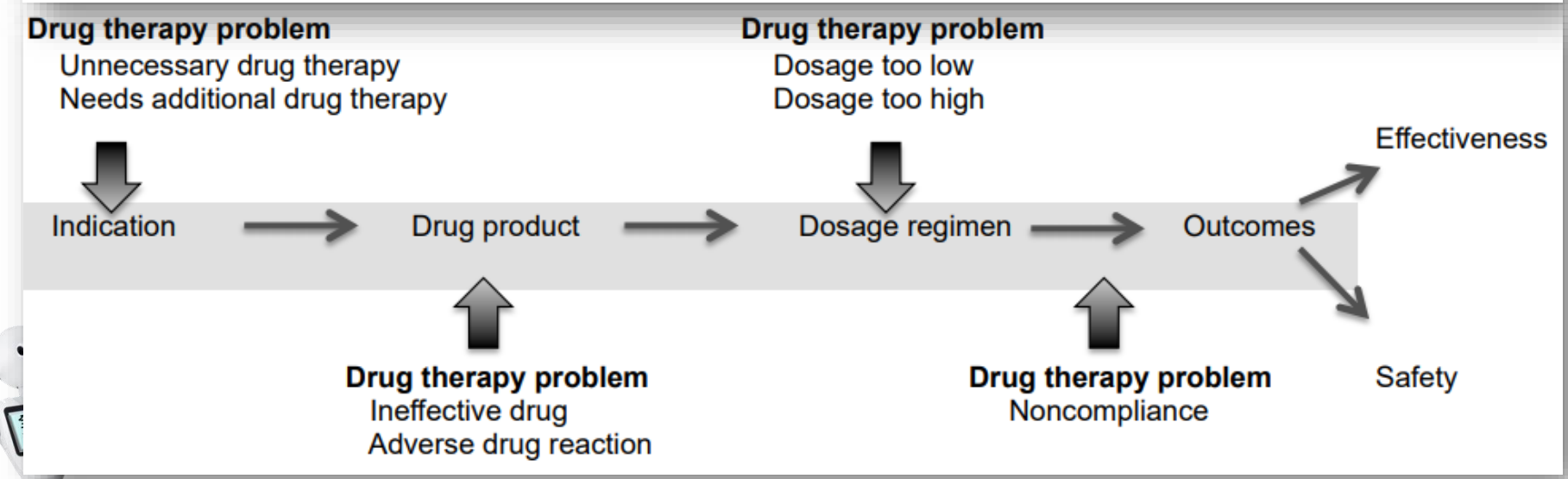
- Clinical pharmacist develops an **individualized** medication therapy **care plan** in collaboration with the **patient** and the **health care team** that achieves the intended **goals of therapy** with appropriate **follow-up** to ensure **optimal medication use and outcomes**.


2. Evaluation of Medication Therapy
• Assess appropriateness of current medications (health conditions, indication, and the therapeutic goals of each medication)
• Evaluate effectiveness, safety, and affordability of therapies
• Assess medication-use and adherence of therapies
• Identify medication-related problems and evaluate collaboratively the need for intervention(s)
1. Assessment of the Patient
• Review medical record using a problem-oriented framework (e.g. subjective and objective information) to determine the clinical status of patient
• Obtain and document complete medication history
• Obtain, organize, and interpret patient data
• Prioritize patient problems and medication-related needs
3. Development & Initiation of Plan
• Review patient's active medical problem list for individualized assessment and plan for optimizing therapies
• Formulate a comprehensive medication management assessment and plan to achieve patient-specific outcomes
• Educate patient/caregivers to ensure understanding of the plan, optimize adherence, and improve therapeutic outcomes
• Establish patient-specific measurable parameters and time frames for monitoring and follow-up
Clinical Pharmacist Process of Care in Team-Based Practices
4. Follow-up & Medication Monitoring

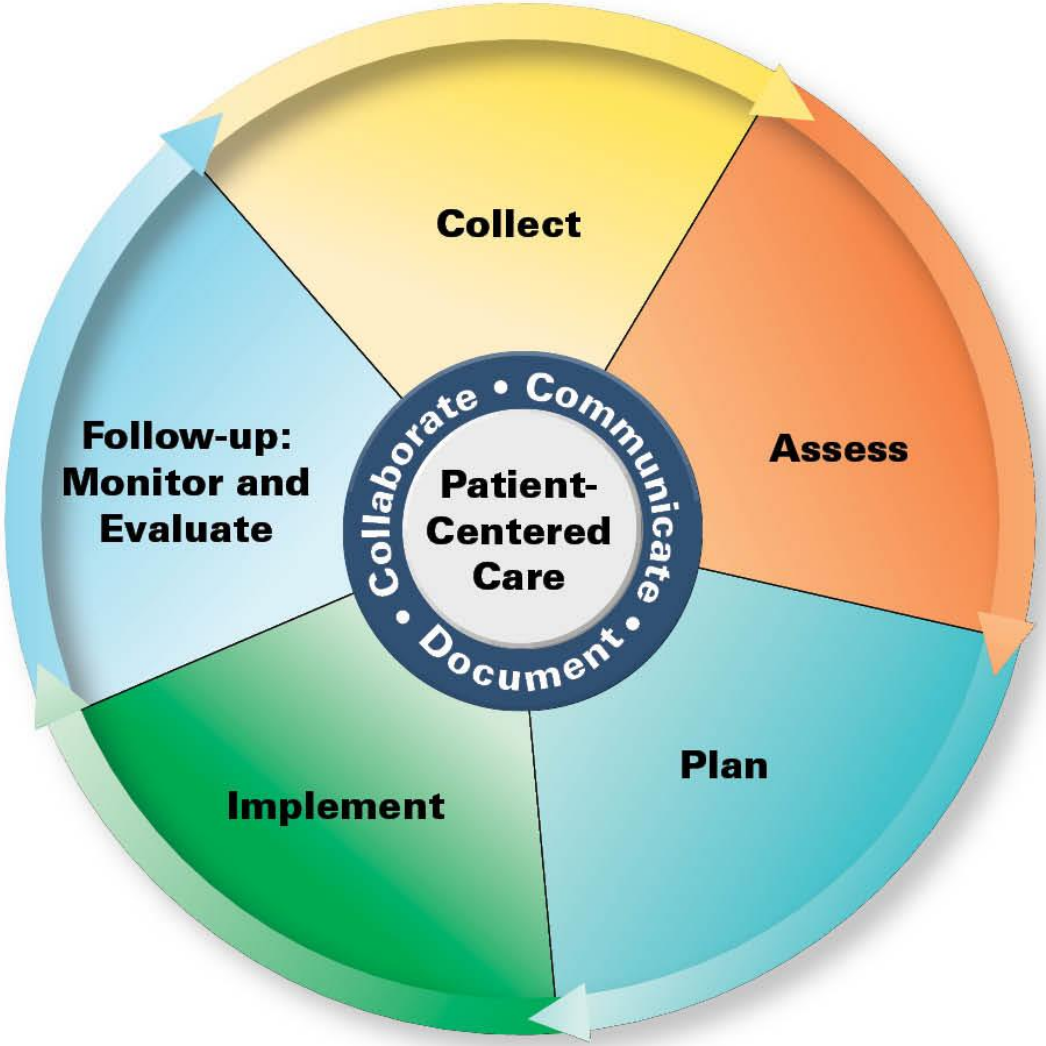
Pharmacotherapy workup for systematic assessment of patients drug-related needs



University of Helsinki; 2012. http:// urn.fi/URN:ISBN:978-952-10-7698-5. Accessed 16 May 2012



Pharmacists' Patient Care Process



Pharmacists' Patient Care Process

Pharmacists use a patient-centered approach in collaboration with other providers on the health care team to optimize patient health and medication outcomes.

Using principles of evidence-based practice, pharmacists:

Collect
The pharmacist assures the collection of the necessary subjective and objective information about the patient in order to understand the relevant medical/medication history and clinical status of the patient.

Assess
The pharmacist assesses the information collected and analyzes the clinical effects of the patient's therapy in the context of the patient's overall health goals in order to identify and prioritize problems and achieve optimal care.

Plan
The pharmacist develops an individualized patient-centered care plan, in collaboration with other health care professionals and the patient or caregiver that is evidence-based and cost-effective.

Implement
The pharmacist implements the care plan in collaboration with other health care professionals and the patient or caregiver.

Follow-up: Monitor and Evaluate
The pharmacist monitors and evaluates the effectiveness of the care plan and modifies the plan in collaboration with other health care professionals and the patient or caregiver as needed.

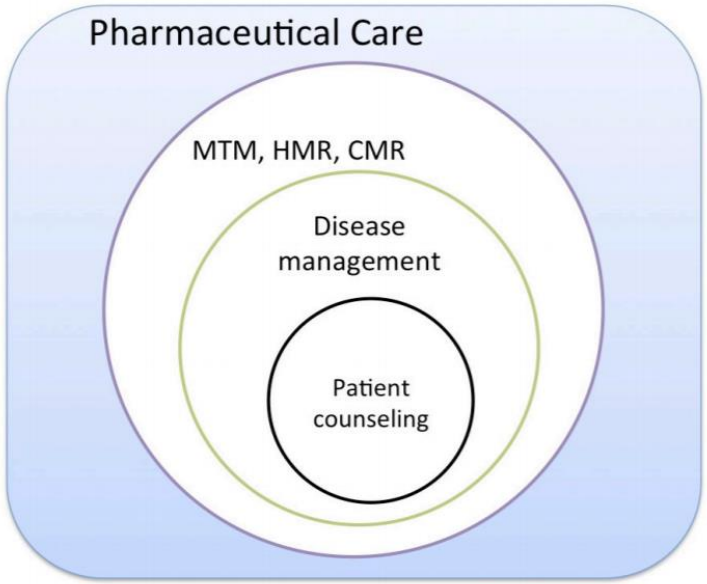
Joint Commission of Pharmacy Practitioners 2014

Collect and Analyze

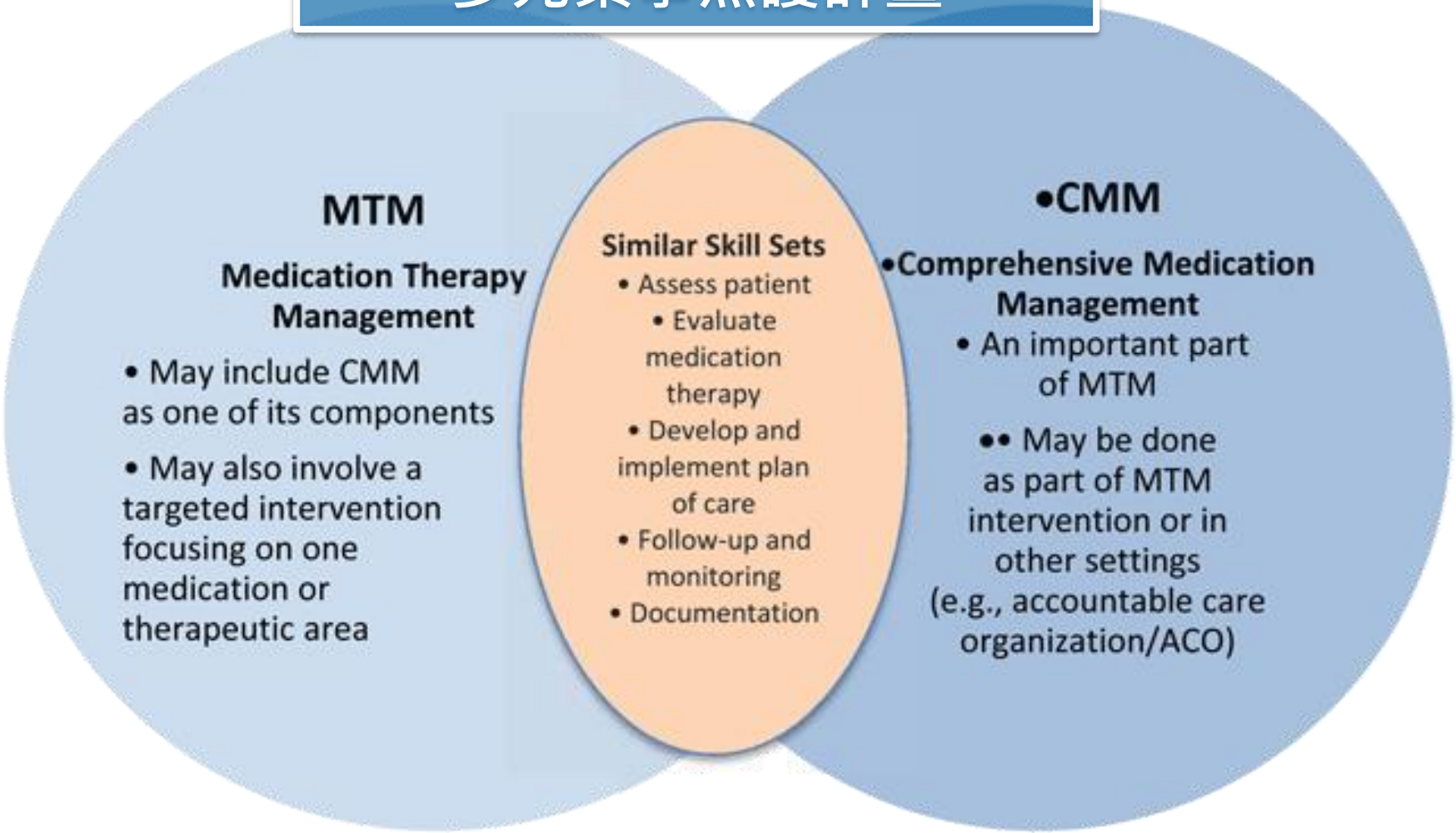
Inquire as to whether the patient has any questions or concerns for the visit.	Review social history (e.g., alcohol, tobacco, caffeine, other substance use).	Review social determinants of health relevant to medication use	Review past medication history, including allergies and medication adverse effects.
Obtain and reconcile a complete medication list that includes all current prescription and nonprescription medications, and complementary and alternative medicine	Review the indication for each medication.	Review the effectiveness of each medication.	Review the safety of each medication.
Review the patient's adherence to his/her medications using available resources	Review the patient's medication experience	Determine the patient's personal goals of therapy.	Review how the patient manages his/her medications at home

CMM

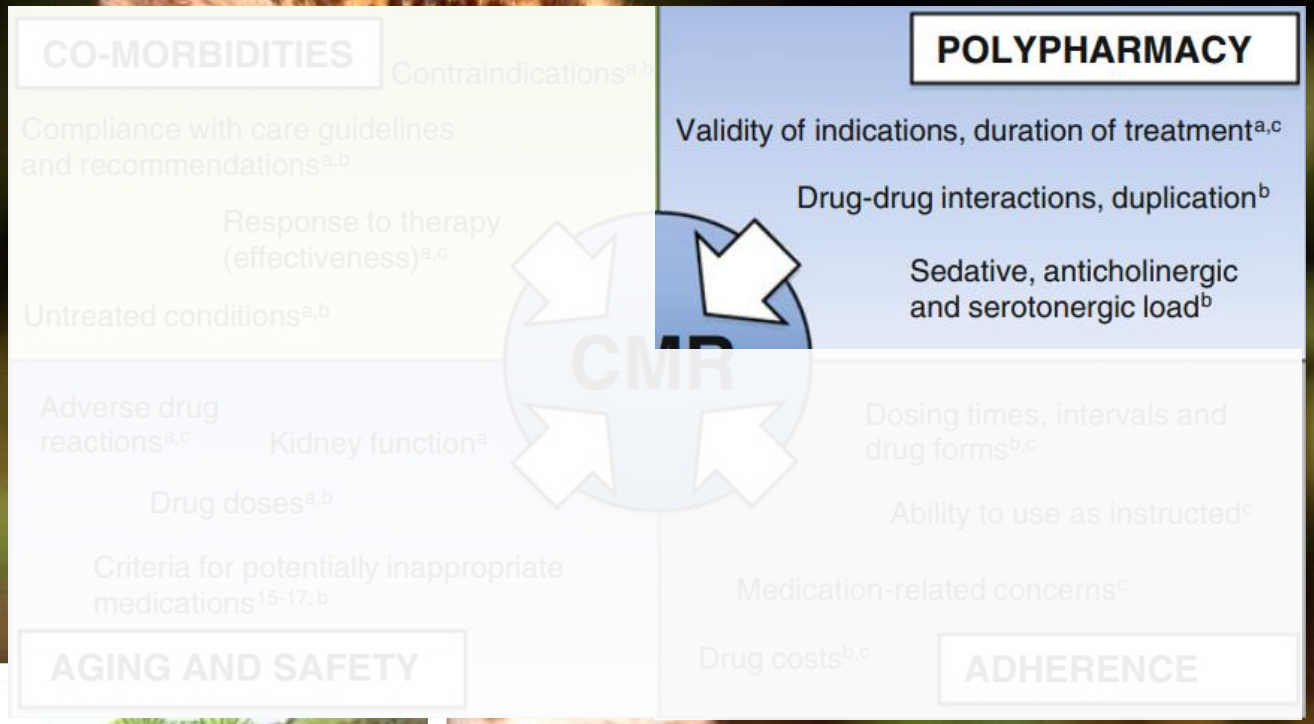
- Ensures each patient’ s medications (**prescription, nonprescription, alternative, traditional, vitamins, or nutritional supplements**) are individually assessed.
- Purpose
  - **Optimize medication use**
    - Appropriate indication
    - Effective
    - Safe
    - Able to be adhered to
  - **Improve patient health outcomes**
- **Patient-centered**
  - Patient is an active participant
- **Collaborative**
  - Pharmacists worked closely with healthcare team



高診次者藥事照護計畫
特殊族群藥事照護計畫
多元藥事照護計畫



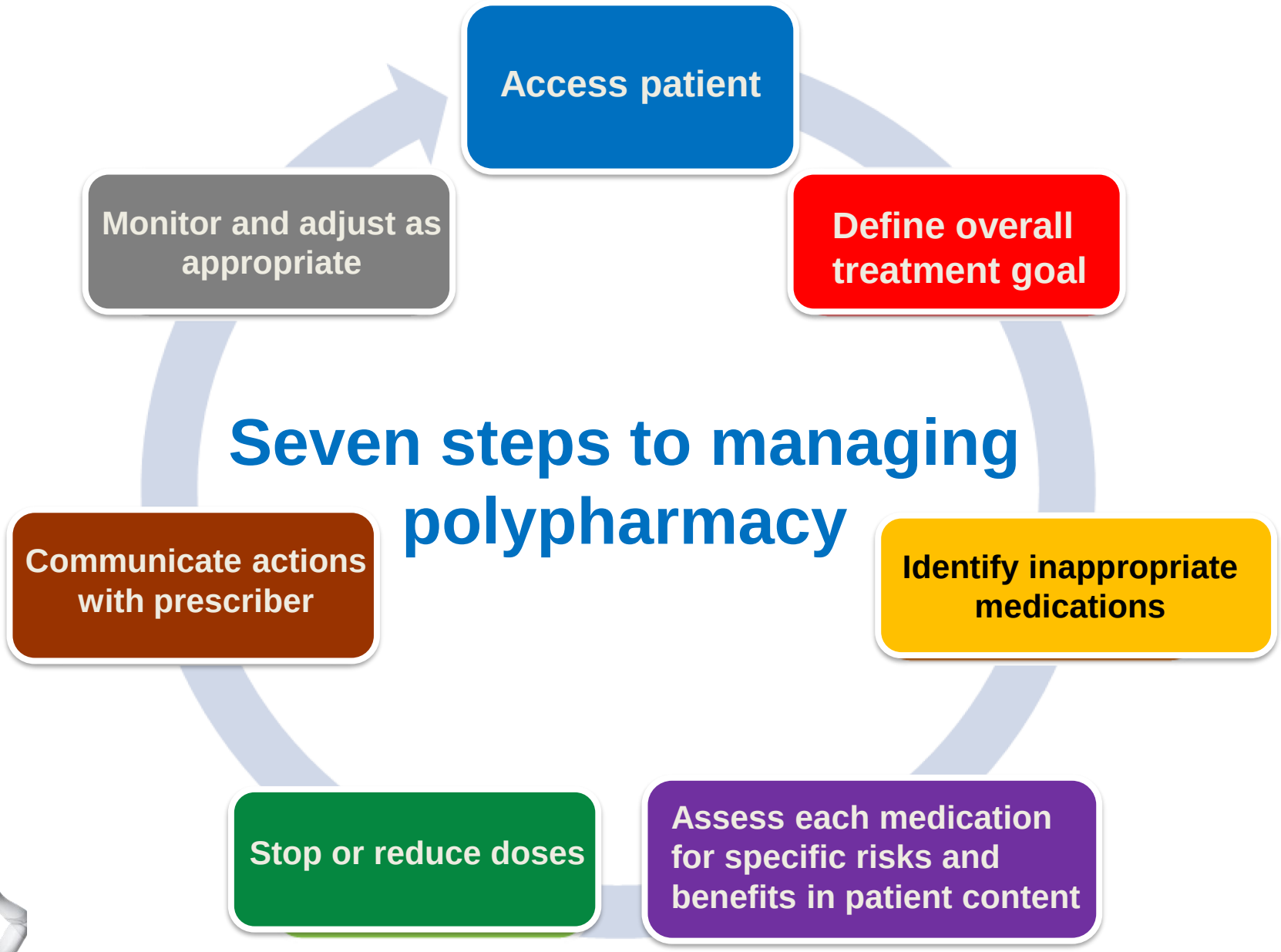
More than polypharmacy



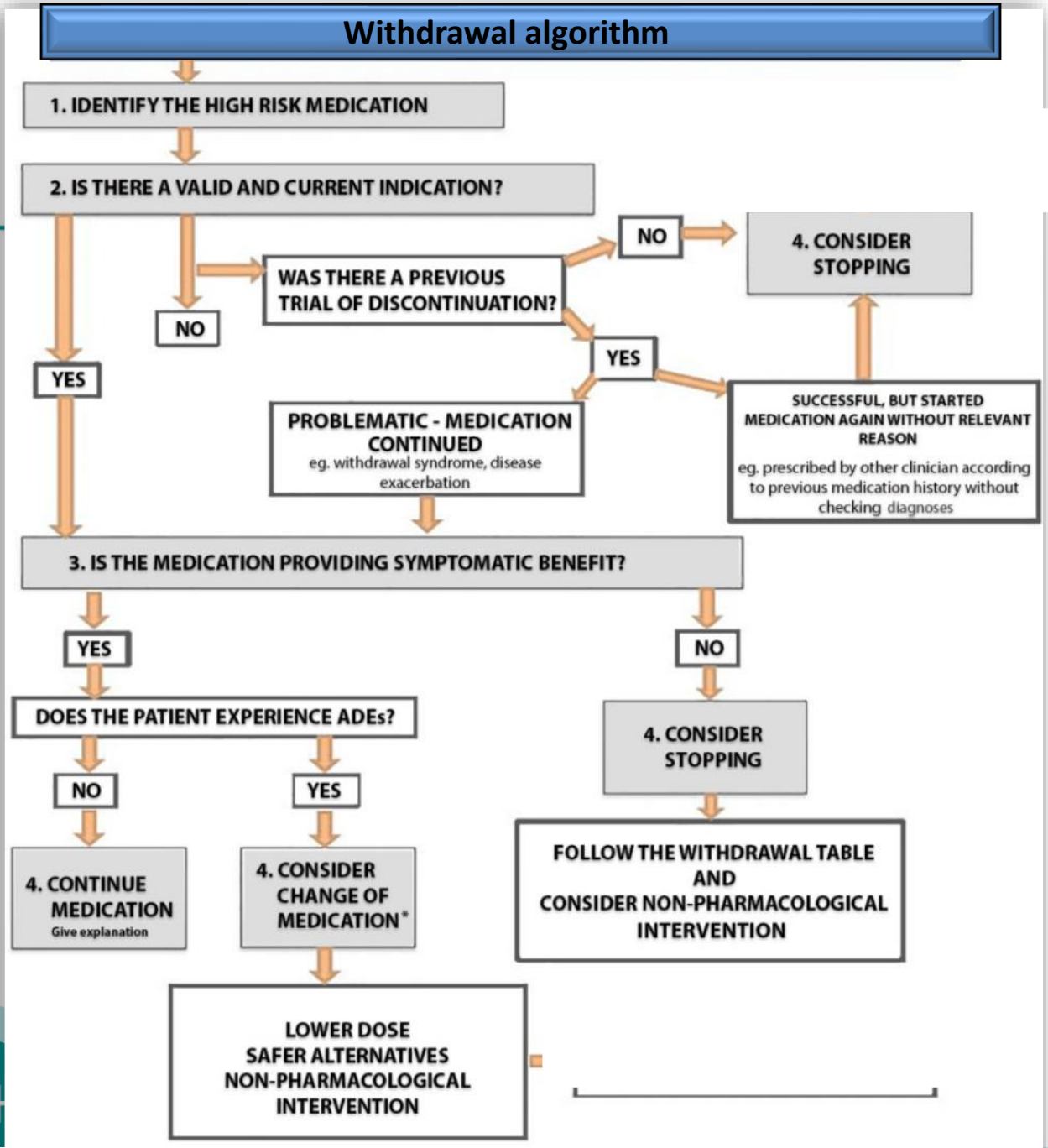
管中窺豹
時見一斑

評估老年人
不適當用藥工具

Seven steps to managing polypharmacy



Withdrawal algorithm



*NOTE: The "Withdrawal Table" information for the current medication should also be followed while changing a current medication for a safer alternative or non-pharmacological intervention.

Geriatr Gerontol Int. 2015 Sep 3.

Potential Inappropriate Medication (PIM)

Potentially Inappropriate Medications are...

treatments with risks that may outweigh their benefits

TCVGH

Tools to Evaluate PIM

Over 46 published tools

- 20 (43%) relate to previously published tools.
- 18 use Beers Criteria for their basis
- 28 use explicit criteria
- 36 are directly targeted for geriatrics

TCVGH

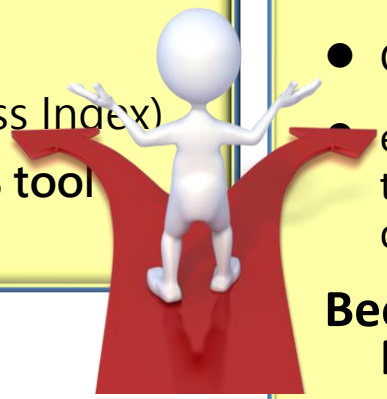
Kaufmann. *Eur J Clin Pharmacol*.2014;70:1-11

Tools to evaluate PIM

Implicit (judgment-based)

- Rely on expert professional judgment
- Focus on the patient, address entire medication regimen (patient specific)
- Time consuming
- Low reliability
- e.g. statement: „Is there an indication for the drug? “ (Medication Appropriateness Index)

MAI, Lipton criteria, NO TEARS tool



Explicit (criterion-based)

- Developed from literature reviews, expert opinions, consensus techniques
- Lists of drugs, drug-classes, dosages known to cause harmful effects (drug/disease specific)
- Applied with little/no clinical judgment
- Don‘t address burden of co-morbidities, patient preferences => rigid standards
- Regular updates are needed
- Country-specific adaption necessary
- e.g. statement: „Avoid benzodiazepines (any type) for treatment of insomnia, agitation, or delirium in older adults.“ (Beers, 2012)

Beers, START/STOPP, McLeod, PRISCUS

TCVGH

Drugs Aging 2012; 29 (6):437-452

Medication appropriateness index (MAI)

- Indication
- Effectiveness
- Dose
- Correct directions
- Practical directions
- Drug–drug interactions
- Drug–disease interactions
- Duplication
- Duration
- Cost

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J Clin Epidemiol. 1992;45(10):1045–1051.

Medication Appropriateness Index

Table 1. Medication Appropriateness Index[8]	
Question	Score[(a)]
1. Is there an indication for the drug?	3
2. Is the medication effective for the condition?	3
3. Is the dosage correct?	2
4. Are the directions correct?	2
5. Are the directions practical?	2
6. Are there clinically significant drug-drug interactions?	2
7. Are there clinically significant drug-disease/condition interactions?	1
8. Is there unnecessary duplication with other drug(s)?	1
9. Is the duration of therapy acceptable?	1
10. Is this drug the least expensive alternative compared with others of equal utility?	1
Maximal score of inappropriateness	18

Pharm Pract (Granada). 2012 Oct;10(4):181-7.

HanlonJT et al(1992) A methodforassessing drug therapy appropriateness. J ClinEpidemiol45(10):1045–1051

Beers and STOPP/START

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Beers criteria

- A list of PIMs was developed and published by Beers and colleagues for **nursing home residents** in **1991**.
- The original Beers criteria have been revised in 1997, 2003, 2012, 2015 and **most recently in 2019.**
- The criteria since 2012 include over 50 medications designated in one of three categories: those that **should always be avoided** ; those that are **potentially inappropriate in older adults with particular health conditions or syndromes**; and those that **should be used with caution.**

Always avoided

Potentially inappropriate

Used with caution

Beers 1997

- 28 generally avoided medications/classes
- 15 conditions and medications that should be avoided in these conditions

- 48 generally avoided medications/classes
- 20 conditions and medications that should be avoided in these conditions

- 34 generally avoided medications/classes
- 14 conditions and medications that should be avoided in these conditions
- 5 medication to be used with caution

2015

2019

JAGS 63:2227–2246, 2015

CLINICAL INVESTIGATION

American Geriatrics Society 2019 Updated AGS Beers Criteria® for Potentially Inappropriate Medication Use in Older Adults

*By the 2019 American Geriatrics Society Beers Criteria® Update Expert Panel**

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21, 2019.

Key words:
Beers Criter

Table 2. 2019 American Geriatrics Society Beers Criteria® for Potentially Inappropriate Medication Use in Older Adults[a]

Organ System, Therapeutic Category, Drug(s)	Rationale	Recommendation	Quality of Evidence	Strength of Recommendation
Anticholinergics[b]				
First-generation antihistamine			Moderate	Strong
Brompheniramine				
Carbinoxamine				
Chlorpheniramine				
Clemastine				
Cyproheptadine				
Dexbrompheniramine				
Dexchlorpheniramine				
Dimenhydrinate				
Diphenhydramine (oral)				
Doxylamine				
Hydroxyzine				
Meclizine				
Promethazine				
Pyrilamine				
Triprolidine				
Antiparkinsonian agents	Not recommended for prevention or treatment of	Avoid	Moderate	Strong
Benztropine (oral)				
Trihexyphenidyl				
Antispasmodics			Moderate	Strong
Atropine (excludes ophthal				
Belladonna alkaloids				
Clidinium-chlordiazepoxide				
Dicyclomine Homatropine (excludes opthalmic)				

Organ System

Therapeutic Category

Drug

American Geriatrics Society 2019 Updated AGS Beers Criteria® for Potentially Inappropriate Medication Use in Older Adults

*By the 2019 American Geriatrics Society Beers Criteria® Update Expert Panel**

Table 2: PIM in Older Adults

Table 3: PIM due to Drug-Disease or Drug-Syndrome Interactions That May Exacerbate the Disease or Syndrome.

Table 4: Drugs To Be Used With Caution in Older Adults

Table 5: Potentially Clinically Important Drug-Drug Interactions That Should Be Avoided in Older Adults.

Table 6: Should Be Avoided or Have Their Dosage Reduced With Varying Levels of Kidney Function in Older Adults

Table 7: Drug With Strong Anticholinergic Properties

STOPP/START

1. International Journal of Clinical Pharmacology and Therapeutics, Vol. 46 – No. 2/2008 (72-83)
2. STOPP (Screening Tool of Older Person's potentially inappropriate Prescriptions)
3. START(Screening Tool to Alert doctors to the Right, i.e. appropriate, indicated Treatment).
4. 65 stopp and 22 start

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American Geriatrics Society 2015 Updated Beers Criteria for Potentially Inappropriate Medication Use in Older Adults

STOPP/START criteria for potentially inappropriate prescribing in older people: version 2

Age and Ageing 2015; **44:** 213–218

STOPP/START criteria would be enhanced by seeking the input of a wider ranging panel of experts from across Europe than the panel of Irish and UK experts involved in the validation of version 1; this was to reflect Europe-wide prescribing practices in the general population of older people.

Beers criteria		STOPP/START	
2003	➢48 PIM		
2012	➢34 PIM	2008 Version 1	65 stopp and 22 start
2015	➢37 PIM	2014 Version 2	80 stopp and 34 start

Table 1. **STOPP**: **S**creening **T**ool of **O**lder **P**eople's potentially inappropriate **P**rescriptions.
The following drug prescriptions are potentially inappropriate in persons aged ≥ 65 years of age.

A. Cardiovascular system

1. Digoxin at a long-term dose > 125 µg/day with impaired renal function* (*increased risk of toxicity*) [Cusack et al. 1979, Gooselink et al. 1997, Haas and Young 1999].
2. Loop diuretic for dependent ankle edema only i.e. no clinical signs of heart failure (*no evidence of efficacy, compression hosiery usually more appropriate*) [Alguire and Mathes1997, Kolbach et al. 2004].
3. Loop diuretic as first-line monotherapy for hypertension (*safer, more effective alternatives available*) [Williams et al. 2004].
4. Thiazide diuretic with a history of gout (*may exacerbate gout*) [Gurwtiz et al. 1997].

Physiologic systems

START: **S**creening **T**ool to **A**lert doctors to **R**ight, i.e. appropriate, indicated **T**reatments.
These medications should be considered for people ≥ 65 years of age with the following conditions, where no contraindication to prescription exists.

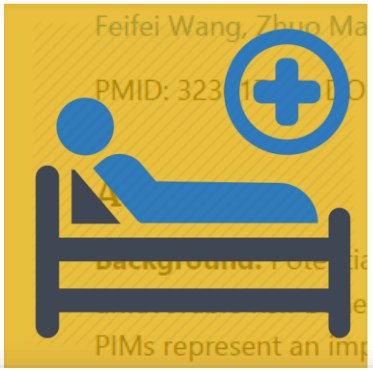
A. Cardiovascular system

1. Warfarin in the presence of chronic atrial fibrillation [Hart et al. 1999, Ross et al. 2005, Mant et al. 2007].
2. Aspirin in the presence of chronic atrial fibrillation, where warfarin is contraindicated, but not aspirin [Hart et al. 1999, Ross et al. 2005].
3. Aspirin or clopidogrel with a documented history of atherosclerotic coronary, cerebral or peripheral vascular disease in patients with sinus rhythm [Smith et al. 2006].

Potentially Inappropriate Medications at Admission and Discharge in Older Adults: A Comparison of the Beers 2019 and 2015 Criteria

Feifei Wang, Zhuo Ma, Meng Liu, Xinan Wu

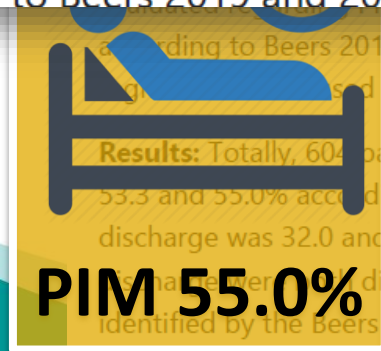
PMID: 323[illegible] DOI: 10.5414/CP203638



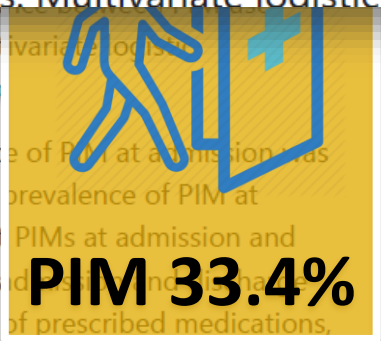
Beers 2015

Materials and methods: This was a cross-sectional study conducted in a tertiary hospital in China. Hospitalized patients in the internal medicine department aged ≥ 60 years were enrolled from June 2018 to Oct[illegible] information on medications at admission and discharge was collected and evaluated regarding PIMs using Beers 2019 and 2015 criteria. The concordance between PIM use according to Beers 2019 and 2015 criteria was calculated using κ tests. Multivariate logistic

≥ 60 years?????



Beers 2019



PIM 55.0%

PIM 33.4%

Results: Totally, 604 patients aged ≥ 60 years were included. The prevalence of PIM at admission was 53.3 and 55.0% according to the Beers 2015 and 2019 criteria, whereas the prevalence of PIM at discharge was 32.0 and 33.4% according to both criteria. The most frequent PIMs at admission and discharge were diuretics according to the Beers 2019 criteria. PIMs at admission identified by the Beers 2019 criteria were both associated with the number of prescribed medications, acute heart failure, and chronic heart failure.

Conclusion: The Beers 2019 and 2015 criteria showed good accordance in our study.

Oncologist. 2019 Nov 27;theoncologist.2019-0085. doi: 10.1634/theoncologist.2019-0085. Online ahead of print.

Polypharmacy, Inappropriate Medication Use, and Drug Interactions in Older Korean Patients With Cancer Receiving First-Line Palliative Chemotherapy

Soojung Hong [1], Ju Hyun Lee [2], Eun Kyeong Chun [3], Kwang-Il Kim [2], Jin Won Kim [2], Se Hyun Kim [2], Yun-Gyoo Lee [4], In Gyu Hwang [5], Jin Young Kim [6], Su-Jin Koh [7], Yoon Ho Ko [8], Seong Hoon Shin [9], In Sook Woo [10], Tae-Yong Kim [11], Ji Yeon Baek [12], Hyun Jung Kim [13], Hyo Jung Kim [14], Myung Ah Lee [15], Jung Hye Kwon [16], Yong Sang Hong [17], Hun-Mo Ryoo [18], Jee Hyun Kim [19]

Affiliations

PMID: 31776181 DOI: 10.1634/theoncologist.2019-0085

Free article

Abstract

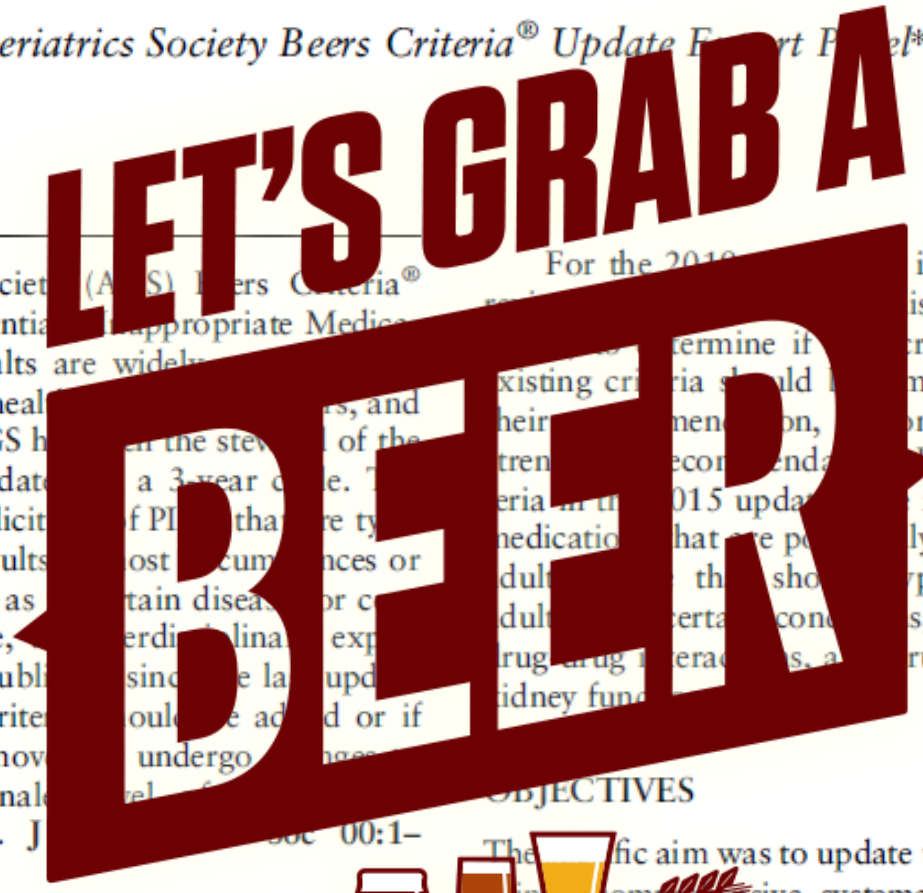
Background: Polypharmacy is an important issue in the care of older patients with cancer, as it increases the risk of unfavorable outcomes. We estimated the prevalence of polypharmacy, potentially inappropriate medication (PIM) use, and drug-drug interactions (DDIs) in older patients with cancer in Korea and their associations with clinical outcomes.

Subjects, materials, and methods: This was a secondary analysis of a prospective observational study of geriatric patients with cancer undergoing first-line palliative chemotherapy. Eligible patients were older adults (≥70 years) with histologically diagnosed solid cancer who were candidates for first-line palliative chemotherapy. All patients enrolled in this study received a geriatric assessment (GA) at

CLINICAL INVESTIGATION

American Geriatrics Society 2019 Updated AGS Beers Criteria® for Potentially Inappropriate Medication Use in Older Adults

*By the 2019 American Geriatrics Society Beers Criteria® Update Expert Panel**



The American Geriatrics Society (AGS) Beers Criteria® (AGS Beers Criteria®) for Potentially Inappropriate Medication Use in Older Adults are widely used by clinicians, educators, researchers, healthcare systems, and regulators. Since 2011, the AGS has convened an interdisciplinary expert panel to update the stewardship of the criteria and has produced updates on a 3-year cycle. The AGS Beers Criteria® is an explicit list of PIMs that are typically best avoided by older adults in most circumstances or under specific situations, such as certain diseases or conditions. For the 2019 update, an interdisciplinary expert panel reviewed the evidence published since the last update (2015) to determine if new criteria should be added or if existing criteria should be removed or undergo changes to their recommendation, rationale, level of evidence, or strength of recommendation. J Am Geriatr Soc 00:1–21, 2019.

Key words: medications; drugs; older adults; Beers Criteria

For the 2019 update, an interdisciplinary expert panel reviewed the evidence published since the last update (2015) to determine if new criteria should be added or if existing criteria should be removed or undergo changes to their recommendation, rationale, level of evidence, or strength of recommendation. Each of the five types of criteria in the 2015 update were retained in this 2019 update: medications that are potentially inappropriate in most older adults (the list should typically be avoided in older adults), certain conditions, drugs to use with caution, drug-drug interactions, and drug dose adjustment based on kidney function.

OBJECTIVES

The specific aim was to update the 2015 AGS Beers Criteria® using a comprehensive, systematic review and grading of the evidence on drug-related problems and adverse events in older adults. The strategies to achieve this aim were to:

Table 2 (Contd.)

Organ System, Therapeutic Category, Drug(s)	Rationale	Recommendation	Quality of Evidence	Strength of Recommendation
Central alpha-agonists Clonidine for first-line treatment of hypertension Other CNS alpha-agonists Guanabenz Guanfacine Methyldopa Reserpine (>0.1 mg/day)	High risk of adverse CNS effects; may cause bradycardia and orthostatic hypotension; not recommended as routine treatment for hypertension	Avoid as first-line antihypertensive Avoid other CNS alpha-agonists as listed	Low Low	Strong Strong
Disopyramide	May induce heart failure in older adults because of potent negative inotropic action; strongly anticholinergic; other antiarrhythmic drugs preferred	Avoid	Low	Strong
Dronedarone	Worse outcomes have been reported in patients taking dronedarone who have permanent atrial fibrillation or severe or recently decompensated heart failure.	Avoid in individuals with permanent atrial fibrillation or severe or recently decompensated heart failure	High	Strong
Digoxin for first-line treatment of atrial fibrillation or of heart failure	Use in atrial fibrillation: should not be used as a first-line agent in atrial fibrillation, because there are safer and more effective alternatives for rate control supported by high-quality evidence. Use in heart failure: evidence for benefits and harms of digoxin is conflicting and of lower quality; most but not all of the evidence concerns use in HFrEF. There is strong evidence for other agents as first-line therapy to reduce hospitalizations and mortality in adults with HFrEF. In heart failure, higher dosages are not associated with additional benefit and may increase risk of toxicity. Decreased renal clearance of digoxin may lead to increased risk of toxic effects; further dose reduction may be necessary in those with stage 4 or 5 chronic kidney disease.	Avoid this rate control agent as first-line therapy for atrial fibrillation Avoid as first-line therapy for heart failure If used for atrial fibrillation or heart failure, avoid dosages >0.125 mg/day	Atrial fibrillation: low Heart failure: low Dosage >0.125 mg/day: moderate	Atrial fibrillation: strong Heart failure: strong Dosage >0.125 mg/day: strong
Nifedipine, immediate release	Potential for hypotension; risk of precipitating myocardial ischemia	Avoid	High	Strong
Amiodarone	Effective for maintaining sinus rhythm but has greater toxicities than other antiarrhythmics used in atrial fibrillation; may be reasonable first-line therapy in patients with concomitant heart failure or substantial left ventricular hypertrophy if rhythm control is preferred over rate control	Avoid as first-line therapy for atrial fibrillation unless patient has heart failure or substantial left ventricular hypertrophy	High	Strong
Central nervous system				
Antidepressants, alone or in combination Amitriptyline Amoxapine Clomipramine Desipramine Doxepin >6 mg/day Imipramine	Highly anticholinergic, sedating, and cause orthostatic hypotension; safety profile of low-dose doxepin (≤6 mg/day) comparable to that of placebo	Avoid	High	Strong

Avoid Clonidine as firs-line ...

Avoid Digoxin >0.125 mg

Avoid as first-line unless...

Table 2 (Contd.)

Organ System, Therapeutic Category, Drug(s)	Rationale	Recommendation	Quality of Evidence	Strength of Recommendation
Nortriptyline Paroxetine Protriptyline Trimipramine				
Antipsychotics, first (conventional) and second (atypical) generation	Increased risk of cerebrovascular accident (stroke) and greater rate of cognitive decline and mortality in persons with dementia Avoid antipsychotics for behavioral problems of dementia or delirium unless nonpharmacological options (eg, behavioral interventions) have failed or are not possible *and* the older adult is threatening substantial harm to self or others	Avoid, except in schizophrenia or bipolar disorder, or for short-term use as antiemetic during chemotherapy	Moderate	Strong
Barbiturates Amobarbital Butabarbital Butalbital Mephobarbital Pentobarbital Phenobarbital Secobarbital	High rate of physical dependence, tolerance to sleep benefits, greater risk of overdose at low dosages	Avoid	High	Strong
Benzodiazepines *Short and intermediate acting:* Alprazolam Estazolam Lorazepam Oxazepam Temazepam Triazolam *Long acting:* Chlordiazepoxide (alone or in combination with amitriptyline or clidinium) Clonazepam Clorazepate Diazepam Flurazepam Quazepam	Older adults have increased sensitivity to benzodiazepines and decreased metabolism of long-acting agents; in general, all benzodiazepines increase risk of cognitive impairment, delirium, falls, fractures, and motor vehicle crashes in older adults May be appropriate for seizure disorders, rapid eye movement sleep behavior disorder, benzodiazepine withdrawal, ethanol withdrawal, severe generalized anxiety disorder, and periprocedural anesthesia	Avoid	Moderate	Strong
Meprobamate	High rate of physical dependence; sedating	Avoid	Moderate	Strong
Nonbenzodiazepine, benzodiazepine receptor agonist hypnotics (ie, "Z-drugs") Eszopiclone Zaleplon Zolpidem	Nonbenzodiazepine benzodiazepine receptor agonist hypnotics (ie, Z drugs) have adverse events similar to those of benzodiazepines in older adults (eg, delirium, falls, fractures); increased emergency room visits/hospitalizations; motor vehicle crashes; minimal improvement in sleep latency and duration	Avoid	Moderate	Strong
Ergoloid mesylates (dehydrogenated ergot alkaloids) Isoxsuprine	Lack of efficacy	Avoid	High	Strong

BZDs

Avoid, but may be appropriate for ...

Z-drugs

Table 2 (Contd.)

Organ System, Therapeutic Category, Drug(s)	Rationale	Recommendation	Quality of Evidence	Strength of Recommendation
Endocrine				
Androgens Methyltestosterone Testosterone	Potential for cardiac problems; contraindicated in men with prostate cancer	Avoid unless indicated for confirmed hypogonadism with clinical symptoms	Moderate	Weak
Desiccated thyroid	Concerns about cardiac effects; safer alternatives available	Avoid	Low	Strong
Estrogens with or without progestins	Evidence of carcinogenic potential (breast and endometrium); lack of cardioprotective effect and cognitive protection in older women	Avoid systemic estrogen (eg, oral and topical patch)	Oral and patch: high	Oral and patch: strong
	Evidence indicates that vaginal estrogens for the treatment of vaginal dryness are safe and effective; women with a history of breast cancer who do not respond to nonhormonal therapies are advised to discuss the risks and benefits of low-dose vaginal estrogen (dosages of estradiol <25 μg twice weekly) with their healthcare provider	Vaginal cream or vaginal tablets: acceptable to use low-dose intravaginal estrogen for management of dyspareunia, recurrent lower urinary tract infections, and other vaginal symptoms	Vaginal cream or vaginal tablets: moderate	Topical vaginal cream or tablets: weak
Growth hormone	Impact on body composition is small and associated with edema, arthralgia, carpal tunnel syndrome, gynecomastia, impaired fasting glucose	Avoid, except for patients rigorously diagnosed by evidence-based criteria with growth hormone deficiency due to an established etiology	High	Strong
Insulin, sliding scale (insulin regimens containing only short- or rapid-acting insulin dosed according to current blood glucose levels without concurrent use of basal or long-acting insulin)	Higher risk of hypoglycemia without improvement in hyperglycemia management regardless of care setting. Avoid insulin regimens that include only short- or rapid-acting insulin dosed according to current blood glucose levels without concurrent use of basal or long-acting insulin. This recommendation does not apply to regimens that contain basal insulin or long-acting insulin.	Avoid	Moderate	Strong
Megestrol	Minimal effect on weight; increases risk of thrombotic events and possibly death in older adults	Avoid	Moderate	Strong
Sulfonylureas, long acting Chlorpropamide Glimepiride Glyburide (also known as glibenclamide)	Chlorpropamide: prolonged half-life in older adults; can cause prolonged hypoglycemia; causes SIADH Glimepiride and glyburide: higher risk of severe prolonged hypoglycemia in older adults	Avoid	High	Strong
Gastrointestinal				
Metoclopramide	Can cause extrapyramidal effects, including tardive dyskinesia; risk may be greater in older adults and with prolonged exposure	Avoid, unless for gastroparesis with duration of use not to exceed 12 weeks except in rare cases	Moderate	Strong
Mineral oil, given orally	Potential for aspiration and adverse effects; safer alternatives available	Avoid	Moderate	Strong
Proton-pump inhibitors	Risk of *Clostridium difficile* infection and bone loss and fractures	Avoid scheduled use for >8 weeks unless for high-risk patients (eg, oral corticosteroids or chronic NSAID use), erosive esophagitis, Barrett esophagitis, pathological hypersecretory condition, or demonstrated need for maintenance treatment (eg, because of failure of drug discontinuation trial or H2-receptor antagonists)	High	Strong

Adding Glimepiride

Metoclopramide : no more than 12 weeks

Table 3. 2019 American Geriatrics Society Beers Criteria® for Potentially Inappropriate Medication Use in Older Adults Due to Drug-Disease or Drug-Syndrome Interactions That May Exacerbate the Disease or Syndrome[a]

Disease or Syndrome	Drug(s)	Rationale	Recommendation	Quality of Evidence	Strength of Recommendation
Cardiovascular					
Heart failure	Avoid: Cilostazol Avoid in heart failure with reduced ejection fraction: Nondihydropyridine CCBs (diltiazem, verapamil) Use with caution in patients with heart failure who are asymptomatic; avoid in patients with symptomatic heart failure: NSAIDs and COX-2 inhibitors Thiazolidinediones (pioglitazone, rosiglitazone) Dronedarone	Potential to promote fluid retention and/or exacerbate heart failure (NSAIDs and COX-2 inhibitors, nondihydropyridine CCBs, thiazolidinediones); potential to increase mortality in older adults with heart failure (cilostazol and dronedarone)	As noted, avoid or use with caution	Cilostazol: low Nondihydropyridine CCBs: moderate NSAIDs: moderate COX-2 inhibitors: low Thiazolidinediones: high Dronedarone: high	Cilostazol: strong Nondihydropyridine CCBs: strong NSAIDs: strong COX-2 inhibitors: strong Thiazolidinediones: strong Dronedarone: strong
Syncope	AChEIs Nonselective peripheral alpha-1 blockers (ie, doxazosin, prazosin, terazosin) Tertiary TCAs Antipsychotics: Chlorpromazine Thioridazine Olanzapine	AChEIs cause bradycardia and should be avoided in older adults whose syncope may be due to bradycardia. Nonselective peripheral alpha-1 blockers cause orthostatic blood pressure changes and should be avoided in older adults whose syncope may be due to orthostatic hypotension. Tertiary TCAs and the antipsychotics listed increase the risk of orthostatic hypotension or bradycardia.	Avoid	AChEIs, TCAs, and antipsychotics: high Nonselective peripheral alpha-1 blockers: high	AChEIs and TCAs: strong Nonselective peripheral alpha-1 blockers and antipsychotics: weak
Central nervous system					
Delirium	Anticholinergics (see Table 7 and full criteria available on www.geriatricscareonline.org.) Antipsychotics[b] Benzodiazepines Corticosteroids (oral and parenteral)[c] H2-receptor antagonists Cimetidine Famotidine Nizatidine Ranitidine Meperidine Nonbenzodiazepine, benzodiazepine receptor agonist hypnotics: eszopiclone, zaleplon, zolpidem	Avoid in older adults with or at high risk of delirium because of potential of inducing or worsening delirium Avoid antipsychotics for behavioral problems of dementia and/or delirium unless nonpharmacological options (eg, behavioral interventions) have failed or are not possible *and* the older adult is threatening substantial harm to self or others. Antipsychotics are associated with greater risk of cerebrovascular accident (stroke) and mortality in persons with dementia.	Avoid	H2-receptor antagonists: low All others: moderate	Strong
Dementia or cognitive impairment	Anticholinergics (see Table 7 and full criteria available on www.geriatricscareonline.org) Benzodiazepines Nonbenzodiazepine, benzodiazepine	Avoid because of adverse CNS effects Avoid antipsychotics for behavioral problems of dementia and/or delirium unless nonpharmacological options (eg, behavioral interventions) have failed or	Avoid	Moderate	Strong

NSAID & COX-2 inhibitor
Asymptomatic HF: caution
Symptomatic HF: avoid

H2-blockers against dementia ➔ removed

Table 3 (Contd.)

Disease or Syndrome	Drug(s)	Rationale	Recommendation	Quality of Evidence	Strength of Recommendation
	Zaleplon Zolpidem Antipsychotics, chronic and as-needed use[b]	others. Antipsychotics are associated with greater risk of cerebrovascular accident (stroke) and mortality in persons with dementia.			
History of falls or fractures	Antiepileptics Antipsychotics[b] Benzodiazepines Nonbenzodiazepine, benzodiazepine receptor agonist hypnotics Eszopiclone Zaleplon Zolpidem Antidepressants TCAs SSRIs SNRIs Opioids	May cause ataxia, impaired psychomotor function, syncope, additional falls; shorter-acting benzodiazepines are not safer than long-acting ones. If one of the drugs must be used, consider reducing use of other CNS-active medications that increase risk of falls and fractures (ie, antiepileptics, opioid-receptor agonists, antipsychotics, antidepressants, nonbenzodiazepine and benzodiazepine receptor agonist hypnotics, other sedatives/hypnotics) and implement other strategies to reduce fall risk. Data for antidepressants are mixed but no compelling evidence that certain antidepressants confer less fall risk than others	Avoid unless safer alternatives are not available; avoid antiepileptics except for seizure and mood disorders Opioids: avoid except for pain management in the setting of severe acute pain (eg, recent fractures or joint replacement)	Opioids: moderate All others: high	Strong
Parkinson disease	Antiemetics Metoclopramide Prochlorperazine Promethazine All antipsychotics (except quetiapine, clozapine, pimavanserin)	Dopamine-receptor antagonists with potential to worsen parkinsonian symptoms Exceptions: Pimavanserin and clozapine appear to be less likely to precipitate worsening of Parkinson disease. Quetiapine has only been studied in low-quality clinical trials with efficacy comparable to that of placebo in five trials and to that of clozapine in two others.	Avoid	Moderate	Strong
Gastrointestinal					
History of gastric or duodenal ulcers	Aspirin >325 mg/day Non–COX-2–selective NSAIDs	May exacerbate existing ulcers or cause new/additional ulcers	Avoid unless other alternatives are not effective and patient can take gastroprotective agent (ie, proton-pump inhibitor or misoprostol)	Moderate	Strong
Kidney/urinary tract					
Chronic kidney disease stage 4 or higher (creatinine clearance <30 mL/min)	NSAIDs (non-COX and COX selective, oral and parenteral, nonacetylated salicylates)	May increase risk of acute kidney injury and further decline of renal function	Avoid	Moderate	Strong

SNRI

Table 3 (Contd.)

Disease or Syndrome	Drug(s)	Rationale	Recommendation	Quality of Evidence	Strength of Recommendation
Urinary incontinence (all types) in women	Estrogen oral and transdermal (excludes intravaginal estrogen) Peripheral alpha-1 blockers Doxazosin Prazosin Terazosin	Lack of efficacy (oral estrogen) and aggravation of incontinence (alpha-1 blockers)	Avoid in women	Estrogen: high Peripheral alpha-1 blockers: moderate	Estrogen: strong Peripheral alpha-1 blockers: strong
Lower urinary tract symptoms, benign prostatic hyperplasia	Strongly anticholinergic drugs, except antimuscarinics for urinary incontinence (see Table 7 and full criteria available on www.geriatricscareonline.org)	May decrease urinary flow and cause urinary retention	Avoid in men	Moderate	Strong

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Table 4. 2019 American Geriatrics Society Beers Criteria® for Potentially Inappropriate Medications: Drugs To Be Used With Caution in Older Adults[a]

Drug(s)	Rationale	Recommendation	Quality of Evidence	Strength of Recommendation
Aspirin for primary prevention of cardiovascular disease and colorectal cancer	Risk of major bleeding from aspirin increases substantially in older adults; studies suggest lack of net benefit when used [illegible] in older adults with cardiovascular risk factors, but evidence is not conclusive. Aspirin is generally indicated for secondary prevention in older adults with established cardiovascular disease.	Use with caution in adults ≥70 years	Moderate	Strong
Dabigatran Rivaroxaban	Increased risk of gastrointestinal bleeding compared with warfan but fewer than with other direct oral anticoagulants when used for long-term treatment of VTE or atrial fibrillation in adults ≥75 years.	Use with caution for treatment of VTE or atrial fibrillation in adults ≥75 years	Moderate	Strong
Prasugrel	Increased risk of bleeding in older adults; benefit in highest-risk older adults (eg, those with prior myocardial infarction or diabetes mellitus) may offset risk when used for its approved indication of acute coronary syndrome to be managed with percutaneous coronary intervention	Use with caution in adults ≥75 years	Moderate	Weak
Antipsychotics Carbamazepine Diuretics Mirtazapine Oxcarbazepine SNRIs SSRIs TCAs Tramadol	May exacerbate or cause SIADH or hyponatremia; monitor sodium level closely when starting or changing dosages in older adults	Use with caution	Moderate	Strong
Dextromethorphan/ quinidine	Limited efficacy in patients with behavioral symptoms of dementia (does not apply to treatment of PBA). May increase risk of falls and concerns with clinically significant drug interactions. Does not apply to treatment of pseudobulbar affect	Use with caution	Moderate	Strong
Trimethoprim-sulfamethoxazole	Increased risk of hyperkalemia when used concurrently with an ACEI or ARB in presence of decreased creatinine clearance	Use with caution in patients on ACEI or ARB and decreased creatinine clearance	Low	Strong

Aspirin for primary prevention ≧ 70 y/o → more bleeding

≧ 75 y/o → more bleeding than warfarin

SIADH

Tramadol was added

Sevatrim + ACEI/ARB → hyperkalemia

Table 5. 2019 American Geriatrics Society Beers Criteria® for Potentially Clinically Important Drug-Drug Interactions That Should Be Avoided in Older Adults

Object Drug and Class	Interacting Drug and Class	Risk Rationale	Recommendation	Quality of Evidence	Strength of Recommendation
RAS inhibitor (ACEIs, ARBs, aliskiren) or potassium-sparing diuretics (amiloride, triamterene)	Another RAS inhibitor (ACEIs, ARBs, aliskiren)	Increased risk of hyperkalemia	Avoid routine use in those with chronic kidney disease stage 3a or higher	Moderate	Strong
Opioids	Benzodiazepines	Increased risk of overdose	Avoid	Moderate	Strong
Opioids	Gabapentin, pregabalin	Increased risk of severe sedation-related adverse events, including respiratory depression and death	Avoid concomitant use when transitioning from opioid therapy to gabapentin or pregabalin, or when using gabapentinoids to reduce opioid dose, although caution should be used in all circumstances.	Moderate	Strong
Anticholinergic	Anticholinergic	Increased risk of cognitive decline	Avoid; minimize number of anticholinergic drugs (Table 7)	Moderate	Strong
Antidepressants (TCAs, SSRIs, and SNRIs) Antipsychotics Antiepileptics Benzodiazepines and nonbenzodiazepine, benzodiazepine receptor agonist hypnotics (ie, "Z-drugs") Opioids	Any combination of three or more of these CNS-active drugs[a]	Increased risk of falls (all) and of fracture (benzodiazepines and nonbenzodiazepine, benzodiazepine receptor agonist hypnotics)	Avoid total of three or more CNS-active drugs[a]; minimize number of CNS-active drugs	Combinations including benzodiazepines and nonbenzodiazepine, benzodiazepine receptor agonist hypnotics *or* opioids: high All other combinations: moderate	Strong
Corticosteroids, oral or parenteral	NSAIDs	Increased risk of peptic ulcer disease or gastrointestinal bleeding	Avoid; if not possible, provide gastrointestinal protection	Moderate	Strong
Lithium	ACEIs	Increased risk of lithium toxicity	Avoid; monitor lithium concentrations	Moderate	Strong
Lithium	Loop diuretics	Increased risk of lithium toxicity	Avoid; monitor lithium concentrations	Moderate	Strong
Peripheral α-1 blockers	Loop diuretics	Increased risk of urinary incontinence in older women	Avoid in older women, unless conditions warrant both drugs	Moderate	Strong
Phenytoin	Trimethoprim-sulfamethoxazole	Increased risk of phenytoin toxicity	Avoid	Moderate	Strong
Theophylline	Cimetidine	Increased risk of theophylline toxicity	Avoid	Moderate	Strong
Theophylline	Ciprofloxacin	Increased risk of theophylline toxicity	Avoid	Moderate	Strong
Warfarin	Amiodarone	Increased risk of bleeding	Avoid when possible; if used together, monitor INR closely	Moderate	Strong
Warfarin	Ciprofloxacin	Increased risk of bleeding	Avoid when possible; if used together, monitor INR closely	Moderate	Strong
Warfarin	Macrolides (excluding azithromycin)	Increased risk of bleeding	Avoid when possible; if used together, monitor INR closely	Moderate	Strong

Opioids combination related death

≧ 3 CNS-active drugs : A/B/O → Falls

Avoid Pnenytoin + Sevatrim→↑ phenytoin toxicity

Warfarin + Ciprofloxaxin/Most Macrolide/Sevatrim→↑ bleeding

Table 6. 2019 American Geriatrics Society Beers Criteria® for Medications That Should Be Avoided or Have Their Dosage Reduced With Varying Levels of Kidney Function in Older Adults

Medication Class and Medication	Creatinine Clearance at Which Action Required, mL/min	Rationale	Recommendation	Quality of Evidence	Strength of Recommendation
Anti-infective					
Ciprofloxacin	<30	Increased risk of CNS effects (eg, seizures, confusion) and tendon rupture	Doses used to treat common infections typically require reduction when CrCl <30 mL/min	Moderate	Strong
Trimethoprim-sulfamethoxazole	<30	Increased risk of worsening of renal function and hyperkalemia	Reduce dose if CrCl 15-29 mL/min Avoid if CrCl <15 mL/min	Moderate	Strong
Cardiovascular or hemostasis					
Amiloride	<30	Increased potassium and decreased sodium	Avoid	Moderate	Strong
Apixaban	<25	Lack of evidence for efficacy and safety in patients with a CrCl <25 mL/min	Avoid	Moderate	Strong
Dabigatran	<30	Lack of evidence for efficacy and safety in individuals with a CrCl <30 mL/min. Label dose for patients with a CrCl 15-30 mL/min based on pharmacokinetic data.	Avoid; dose adjustment advised when CrCl >30 mL/min in the presence of drug-drug interactions	Moderate	Strong
Dofetilide	<60	QTc prolongation and torsade de pointes	Reduce dose if CrCl 20-59 mL/min Avoid if CrCl <20 mL/min	Moderate	Strong
Edoxaban	15-50 <15 or >95	Lack of evidence of efficacy or safety in patients with a CrCl <30 mL/min	Reduce dose if CrCl 15-50 mL/min Avoid if CrCl <15 or >95 mL/min	Moderate	Strong
Enoxaparin	<30	Increased risk of bleeding	Reduce dose	Moderate	Strong
Fondaparinux	<30	Increased risk of bleeding	Avoid	Moderate	Strong
Rivaroxaban	<50	Lack of efficacy or safety evidence in patients with a CrCl <30 mL/min	Nonvalvular atrial fibrillation: reduce dose if CrCl 15-50 mL/min; avoid if CrCl <15 mL/min Venous thromboembolism treatment and for VTE prophylaxis with hip or knee replacement: avoid if CrCl <30 mL/min	Moderate	Strong
Spironolactone	<30	Increased potassium	Avoid	Moderate	Strong
Triamterene	<30	Increased potassium and decreased sodium	Avoid	Moderate	Strong
Central nervous system and analgesics					
Duloxetine	<30	Increased gastrointestinal adverse effects (nausea, diarrhea)	Avoid	Moderate	Weak
Gabapentin	<60	CNS adverse effects	Reduce dose	Moderate	Strong
Levetiracetam	≤80	CNS adverse effects	Reduce dose	Moderate	Strong
Pregabalin	<60	CNS adverse effects	Reduce dose	Moderate	Strong
Tramadol	<30	CNS adverse effects	Immediate release: reduce dose Extended release: avoid	Low	Weak
Gastrointestinal					
Cimetidine	<50	Mental status changes	Reduce dose	Moderate	Strong

Table 7. Drugs With Strong Anticholinergic Properties

Antiarrhythmic	Promethazine
Disopyramide	Pyrilamine
	Triprolidine
Antidepressants	
Amitriptyline	
Amoxapine	
Clomipramine	Antimuscarinics
Desipramine	(urinary incontinence)
Doxepin (>6 mg)	Darifenacin
Imipramine	Fesoterodine
Nortriptyline	Flavoxate
Paroxetine	Oxybutynin
Protriptyline	Solifenacin
Trimipramine	Tolterodine
	Trospium
Antiemetics	
Prochlorperazine	Antiparkinsonian agents
Promethazine	Benztropine
	Trihexyphenidyl
Antihistamines (first generation)	
Brompheniramine	Antipsychotics
Carbinoxamine	Chlorpromazine
Chlorpheniramine	Clozapine
Clemastine	Loxapine
Cyproheptadine	Olanzapine
Dexbrompheniramine	Perphenazine
Dexchlorpheniramine	Thioridazine
Dimenhydrinate	Trifluoperazine
Diphenhydramine (oral)	
Doxylamine	Antispasmodics
Hydroxyzine	Atropine (excludes ophthalmic)
Meclizine	Belladonna alkaloids
Clidinium-chlordiazepoxide	Scopolamine (excludes ophthalmic)
Dicyclomine	
Homatropine (excludes ophthalmic)	Skeletal muscle relaxants
Hyoscyamine	Cyclobenzaprine
Methscopolamine	Orphenadrine
Propantheline	

Tips for incorporating the Beers criteria to reduce polypharmacy

Table 1. Key principles to guide optimal use of the American Geriatrics Society Beers Criteria®

1 Medications in the 2019 AGS Beers Criteria® are potentially inappropriate, not definitely inappropriate.	Potentially inappropriate
2 Read the rationale and recommendations statements for each criterion. The caveats and guidance listed there are important.	Read a bit more
3 Understand why medications are included in the AGS Beers Criteria®, and adjust your approach to those medications accordingly.	Think a bit more
4 Optimal application of the AGS Beers Criteria® involves identifying potentially inappropriate medications and where appropriate offering safer nonpharmacologic and pharmacologic therapies.	Identify ➔ Modify
5 The AGS Beers Criteria® should be a starting point for a comprehensive process of identifying and improving medication appropriateness and safety.	Comprehensive review
6 Access to medications included in the AGS Beers Criteria® should not be excessively restricted by prior authorization and/or health plan coverage policies.	Not used in coverage policies
7 The AGS Beers Criteria® are not equally applicable to all countries.	Not universal

Case Scenario

- A **74-year-old obese female** (height :168 cm / Weight: 90 kg) has a past medical history of chronic kidney disease (CKD) stage 2, glaucoma, heart failure with reduced ejection fraction (HFrEF), hyperlipidemia, hypertension (HTN), osteoarthritis, and type 2 diabetes mellitus (T2DM).
- The patient also occasionally complains of constipation, heartburn, and insomnia for which she takes medications as needed.
- She has no known drug allergies.

Case Scenario

Vital signs

- Blood pressure: 150/85 mmHg
- Heart rate: 78 beats/min

Renal function and electrolytes

- serum creatinine: 1 mg/dL,
- Blood urea nitrogen: 15 mg/dL
- Urinary albumin-to-creatinine ratio: 300 mg/g,
- eGFR= 64 mL/min/1.73 m2
- Serum potassium: 3.5 mEq/L

Lipid panel

- Total cholesterol: 245 mg/dL
- HDL: 55 mg/dL, LDL: 190 mg/dL
- Triglycerides:150 mg/dL

Liver enzyme tests:

- AST: 32 IU/L
- ALT: 35 IU/L

Case Scenario

Health Problem	Medication Name	Instructions
Constipation	Docusate	100 mg by mouth 3 times daily as needed
Glaucoma	Timolol (ophthalmic)	1 drop in both eyes twice daily
Heartburn	Famotidine	20 mg by mouth twice daily
	Calcium carbonate antacid	1 tablet as needed
HFrEF/HTN	Carvedilol	12.5 mg by mouth twice daily
	Furosemide	40 mg by mouth daily
HLD	Atorvastatin	20 mg by mouth daily
Insomnia	Zolpidem	10 mg by mouth at bedtime as needed
T2DM	Metformin	500 mg by mouth twice daily
Osteoarthritis	Acetaminophen	500 mg by mouth 4 times daily as needed
	Ibuprofen	200 mg by mouth 4 times daily as needed

Beers list

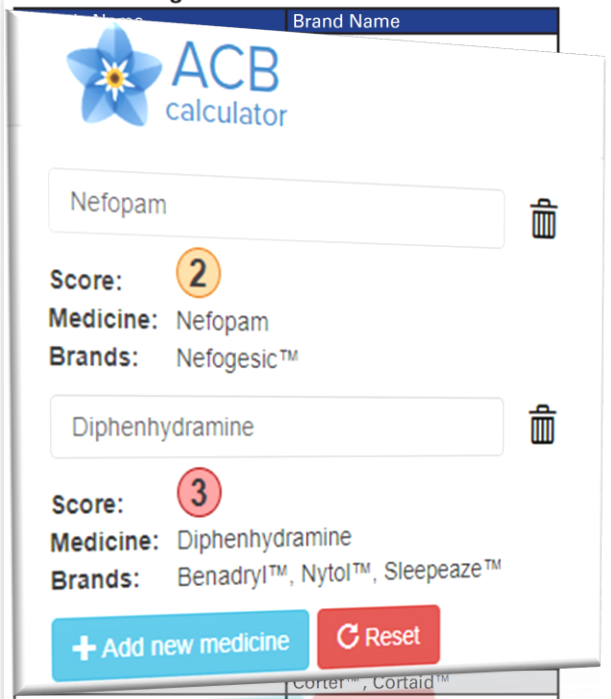
Increased Vulnerability to Anticholinergic Adverse Effects in the Elderly

- **Greater sensitivity**
  - Age-related pharmacokinetic effects
  - Increased blood-brain barrier permeability
  - Decreased central cholinergic activities
- **Pre-existing cognitive impairment**
- **High probability of exposure**
  - Prevalence in community dwelling older adults is 12-25%
  - Use is high even in frail elderly with dementia (20-24%)

Campbell N et al. *ClinIntervAging* 2009;4:225-33.

Drugs with ACB Score of 1

Brand Name
Cortef™, Cortaid™
Fanapt™
Isordil™, Ismo™
Xyzal™
Immodium™, others
Claritin™
Lopressor™, Toprol™
MS Contin™, Avinza™
Procardia™, Adalat™
Invega™
Deltasone™, Sterapred™
Quinaglute™
Zantac™
Risperdal™
Theodur™, Uniphyl™
Desyrel™
Dyrenium™
Effexor™
Coumadin™



Drugs with ACB Score of 2

Generic Name	Brand Name
Amantadine	Symmetrel™
Belladonna	Multiple
Carbamazepine	Tegretol™
Cyclobenzaprine	Flexeril™
Cyproheptadine	Periactin™
Loxapine	Loxitane™

Drugs with ACB Score of 3

Generic Name	Brand Name
Amitriptyline	Elavil™
Amoxapine	Asendin™
Atropine	Sal-Tropine™
Benztropine	Cogentin™
Brompheniramine	Dimetapp™
Carbinoxamine	Histex™, Carbihist™
Chlorpheniramine	Chlor-Trimeton™

Categorical Scoring:

- Possible anticholinergics include those listed with a score of 1; Definite anticholinergics include those listed with a score of 2 or 3

Numerical Scoring:

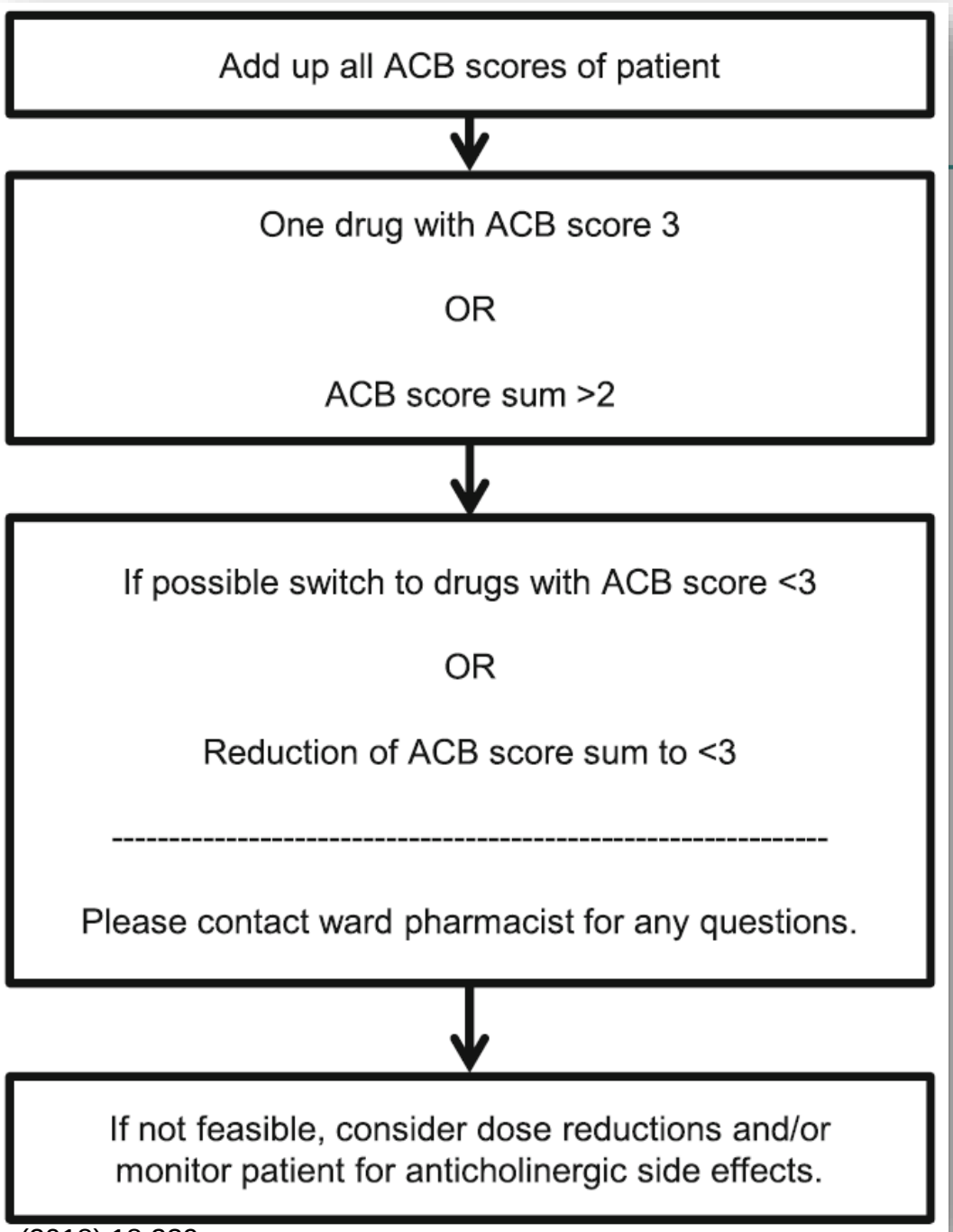
- Add the score contributed to each selected medication in each scoring category
- Add the number of possible or definite Anticholinergic medications

Notes:

- Each definite anticholinergic may increase the risk of cognitive impairment by 46% over 6 years. [3]
- For each on point increase in the ACB total score, a decline in MMSE score of 0.33 points over 2 years has been suggested. [4]
- Additionally, each one point increase in the ACB total score has been correlated with a 26% increase in the risk of death. [4]

Table 2 Characteristics and findings of included studies

Scale	Study, year	Study design	Population	Dementia	*N*	Age (y)[a]	Duration (y)	Adverse outcome(s) studied	Association? Present (+) Absent (−)
Aizenberg's Anticholinergic Burden Scale	Aizenberg et al. 2002 [13]	Prospective	Hospital	No	414	>65	4	Falls	+
Anticholinergic Activity Scale	Ehrt et al. 2010 [14]	Longitudinal cohort	Community (PD)	No	78	74.7	8	Cognitive function	+
Anticholinergic Burden Classification	Ancelin et al. 2006 [5]	Longitudinal study	Nursing home	No	372	>60	U	Cognitive function	+
Anticholinergic Cognitive Burden Scale	Kolanowski et al., 2009 [15]	Cross sectional	Nursing home	Yes	87	>66	2.17	Quality of life	−
	Campbell et al. 2010 [16]	Longitudinal	Community	No	1652	>70	6	Cognitive function	+
	Campbell et al. 2011 [17]	Observational cohort	Hospital	No	147	>65	U	Delirium	−
	Fox et al. 2011 [18]	Longitudinal cohort	Nursing, residential, day hospital, inpatients	Yes, Alzheimer's disease	224	81 ± 7.4	1.5	Cognitive function	−
	Fox et al. 2011 [19]	Longitudinal cohort	Community dwelling and institutional	No	1304	>65	2	Cognitive function	+
								Mortality	+
	Cai et al. 2013 [20]	Retrospective cohort	Primary care clinic	No	3690	>65	1	Cognitive function	+
	Koyama et al. 2014 [21]	Prospective	Community (women)	No	1429	>75	5	Function	+
								Cognition	−
	Koyama et al., 2013 [22]	Longitudinal	Community (women)	No	1484	>75	10	Cognitive function	+
								Dementia	+
	Pasina et al. 2013 [23]	Cross sectional prospective	Hospital	No	1380	>65	0.25	Cognitive function	+
								Physical function	+
	Shah et al. 2013 [24]	Cohort study	Community (catholic clergy)	No	896	>65	10	Cognitive function	+
	Kidd et al. 2014 [25]	Retrospective	Hospital	No	419	>90	0.25	Mortality	−
								Length of stay	−
	Kashyap et al. 2014 [26]	Longitudinal cohort	Outpatient	No	102	71.9 ± 7.3	1	Cognitive function	+
	Mangoni et al. 2013 [27]	Cross-sectional	Hospital	No	71	84 ± 6	1	Mortality	−
	Lanctot et al. 2014 [28]	Cross-sectional	Outpatients with coronary artery disease	No	U	64.2 ± 9.1	NA	Attention, speed, executive function	+



BMC Geriatrics (2018) 18:239

Comparative Associations Between Measures of Anticholinergic Burden and Adverse Clinical Outcomes

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ABSTRACT

PURPOSE No consensus has been reached regarding which anticholinergic scoring system works most effectively in clinical settings. The aim of this population-based cohort study was to examine the association between anticholinergic medication burden, as defined by different scales, and adverse clinical outcomes among older adults.

METHODS From Taiwan's Longitudinal Health Insurance Database, we retrieved data on monthly anticholinergic drug use measured by the Anticholinergic Risk Scale (ARS), the Anticholinergic Cognitive Burden Scale (ACB), and the Drug Burden Index - Anticholinergic component (DBI-Ach) for 116,043 people aged 65 years and older during a 10-year follow-up. For all 3 scales, a higher score indicates greater anticholinergic burden. We used generalized estimating equations to examine the association between anticholinergic burden (ARS and ACB: grouped from 0 to ≥4; DBI-Ach: grouped as 0, 0-0.5, and 0.5-1) and adverse outcomes, and stratified individuals by age-group (aged 65-74, 75-84, and ≥85 years).

RESULTS Compared with the ARS and DBI-Ach, the ACB showed the strongest, most consistent dose-response relationships with risks of all 4 adverse outcomes, particularly in people aged 65 to 84 years. For example, among those 65 to 74 years old, going from an ACB score of 1 to a score of 4 or greater, individuals' adjusted odds ratio increased from 1.41 to 2.25 for emergency department visits; from 1.20 to 1.71 for hospitalizations; from 1.10 to 1.71 for fracture-specific hospitalizations; and from 3.13 to 10.01 for incident dementia.

CONCLUSIONS Compared with the 2 other scales studied, the ACB shows good dose-response relationships between anticholinergic burden and a variety of adverse outcomes in older adults. For primary care and geriatrics clinicians, the ACB may be a helpful tool for identifying high-risk populations for interventions.

ER visit

Hospitalization

Fracture-specific hospitalization

Dementia

Ann Fam Med 2017;15:561-569.

Therapie (2017) 72, 427–437

Available online at

Elsevier Masson France

ORIGINAL ARTICLE

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DOI: 10.31

CLINICA

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Kiesel *et al. BMC Geriatrics* (2018) 18:239
https://doi.org/10.1186/s12877-018-0929-6

BMC

RESEARCH ARTICLE

An anticholinergic burden score for German prescribers: score development

Esther Katharina Kiesel[1*], Yvonne Marina Hopf[1] and Michael Drey[2]

Abstract

Background: Anticholinergic drugs put elderly patients at a higher risk for falls, cognitive decline, as well as peripheral adverse reactions like dry mouth or constipation. Prescribers are often unawa based anticholinergic burden (ACB) of their patients. This study aimed to develop an anticholinergic bu drugs licensed in Germany to be used by clinicians at prescribing level.

Methods: A systematic literature search in pubmed assessed previously published ACB tools. Quan

Optimizing drug therapy- Choosing the best drug

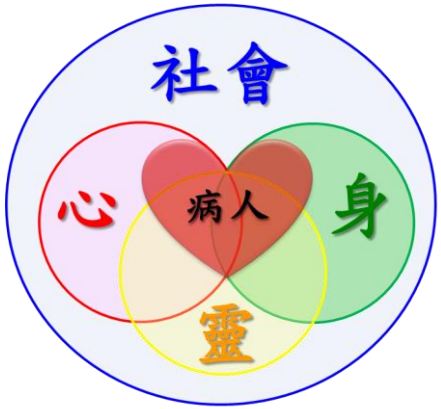
- Avoidance of **inappropriate medications**
- Appropriate use of indicated medications
- Monitoring for side effects and drug levels
- Avoidance of drug-drug interactions
- Involvement of the patient and integration of patient values

Educational interventions, **computerized** order entry and decision support, **multidisciplinary team care** led by physicians, clinical pharmacists, and combinations of these approaches.

藥師於全人照護之角色

高齡病人的全人照護

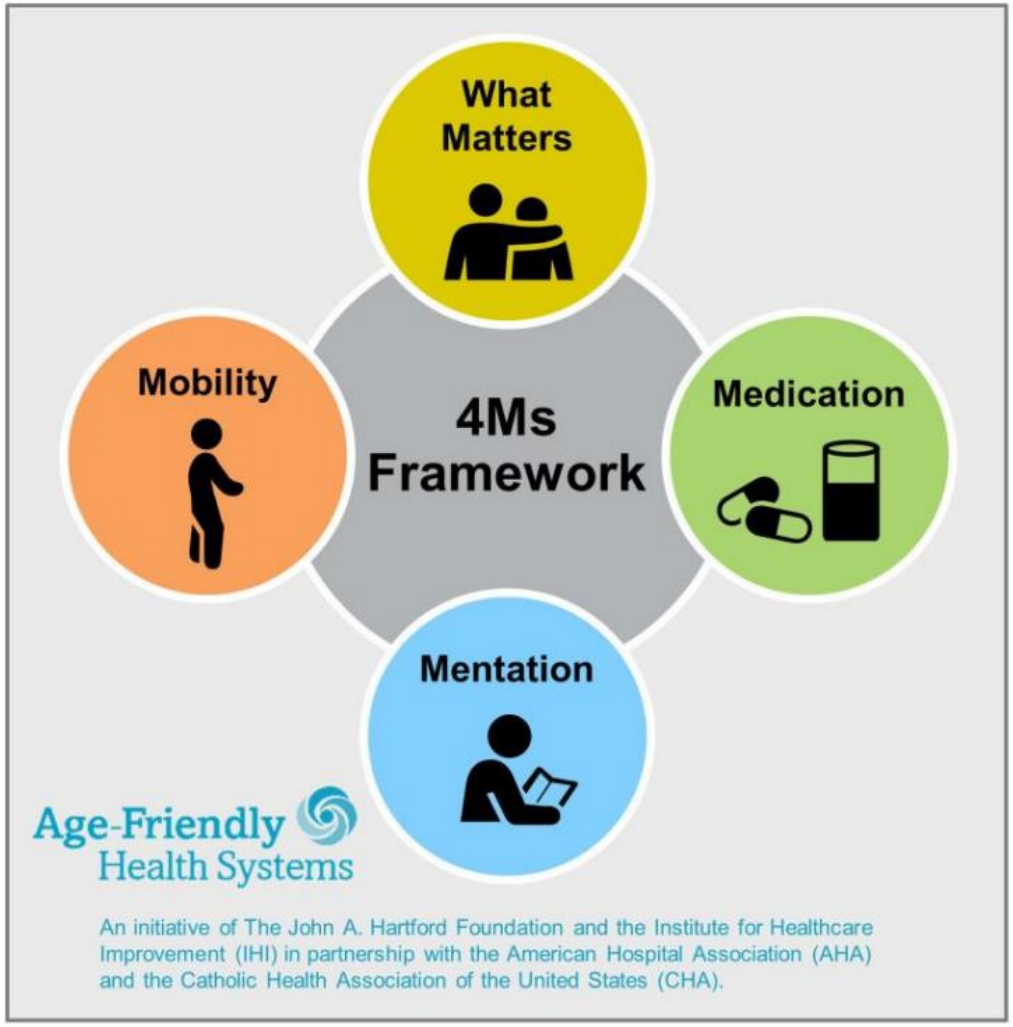
- 在照護病人時，應該把病人視為**整體**，而不是分開為部分體。
- 以病人的需要，包括**生理**、心理、靈性、社會各方面看成一個整體性，尊重以及反應病人的需求、價值以作為所有的臨床決定導向。



跨團隊的全人照護面向

生理	心理	靈性	社會
提供生理上的舒適	提供心理上的舒適	提供靈性照護	瞭解社經環境 的需求
各專業領域的教育、實證醫學、醫療品質、病人安全、團隊醫療	溝通技巧、醫學倫理	安寧照護	出院計畫、社區醫療

4Ms Framework of an Age-Friendly Health System



What Matters

Know and align care with each older adult's specific health outcome goals and care preferences including, but not limited to, end-of-life care, and across settings of care.

Medication

If medication is necessary, use Age-Friendly medication that does not interfere with What Matters to the older adult, Mobility, or Mentation across settings of care.

Mentation

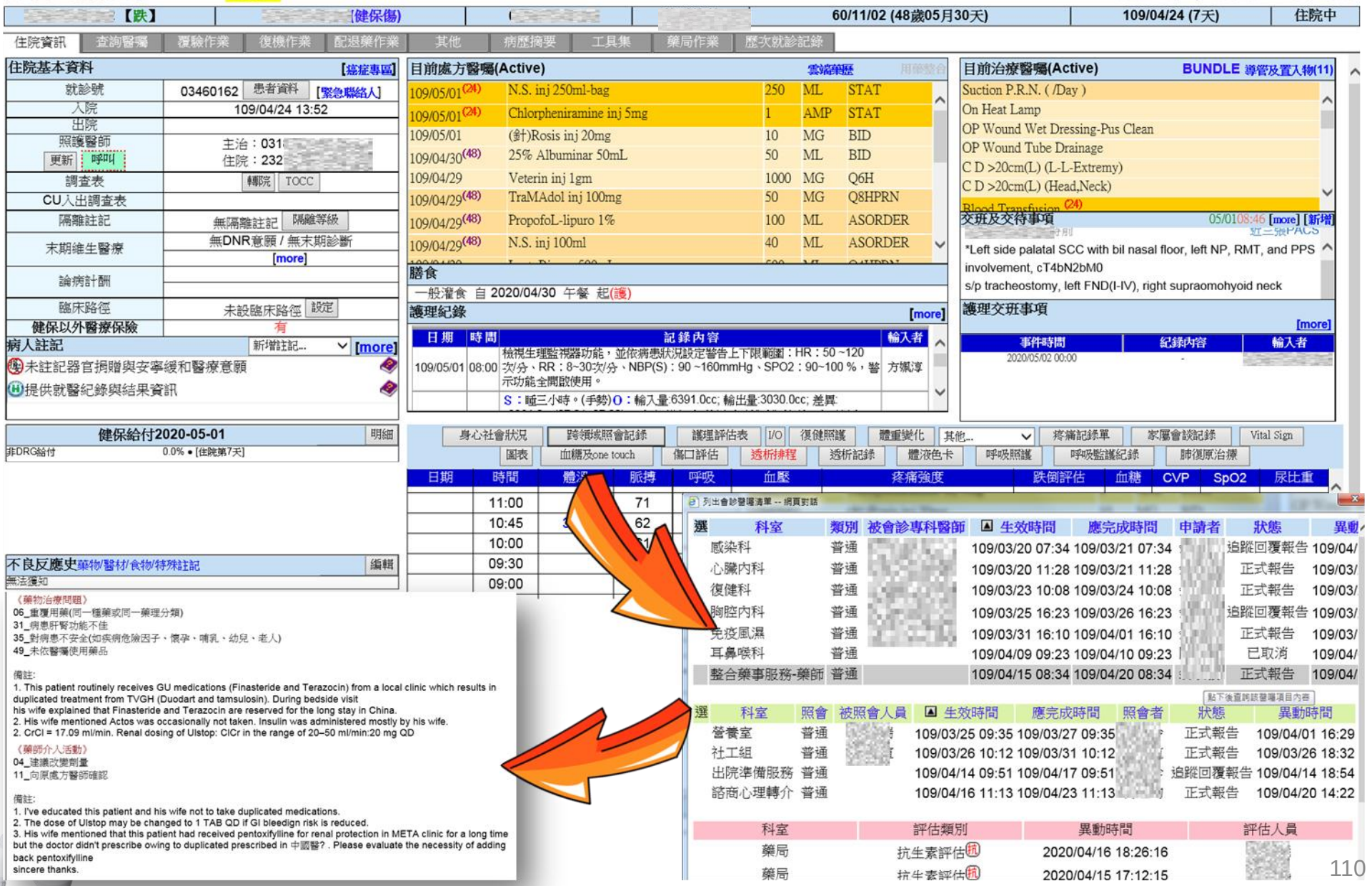
Prevent, identify, treat, and manage dementia, depression, and delirium across settings of care.

Mobility

Ensure that older adults move safely every day in order to maintain function and do What Matters.


W35醫療照護團隊
Health Care Team（ward 35）
翁碩駿
張開明 高齡醫學
林鉦鵬 高齡醫學主治醫師
李毓珊 高齡醫學
周珍怡 高齡醫學主治醫師
程涼揚
黃士嘅
楊素瑄
朱莉瑩 督導長
葉雅惠 護理長
洪玉玲 技術助理員
白曉綺 專科護理師
徐小雯 護理師
王銘專 護理師
林娟瑛 護理師
鄭庭歡 護理師
趙雅胤 護理師
蔡秋足 護理師
陳彥廷 護理師
鄭易婧 護理師
曾正琄 護理師
張婉蓉 護理師
林妤庭 護理師
賴依伶 護理師
許雅茜 護理師
蔡宜婷 護理師
張鈺雯 護理師
盧羿妃 護理師
陳奕珈 護理師
楊佳靜 護理師
古珮菅 護理師
林慧君 護理師

團隊跨領域溝通電子平台



跨領域團隊合作會議

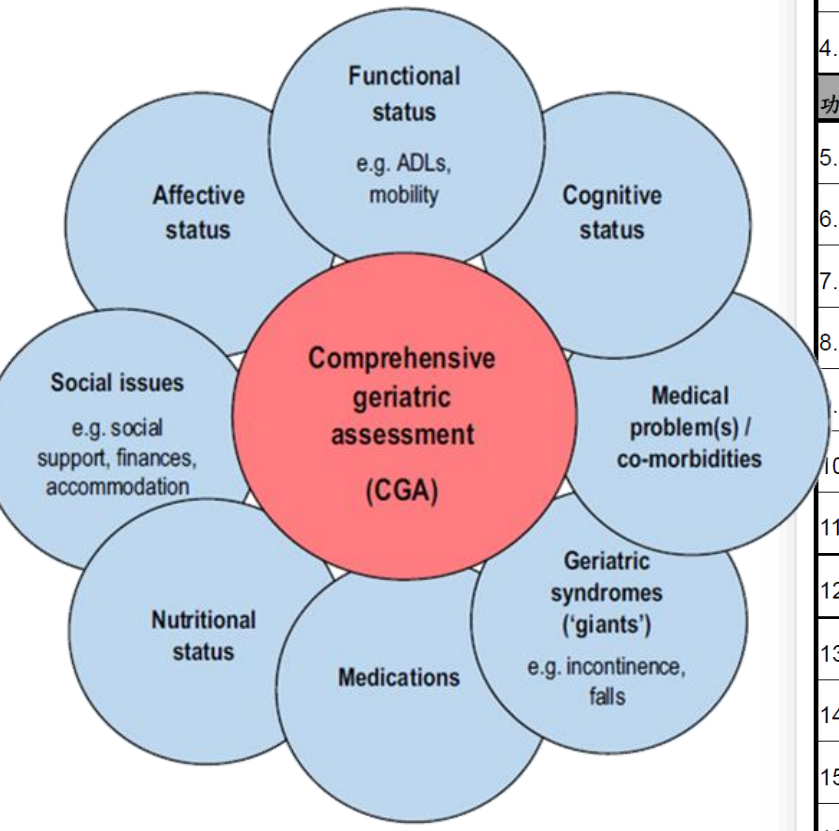
類型	• 個案討論 • 出院準備服務 • 全人醫療
全人醫療	是
跨領域/跨職類	• 跨職類
主辦科別	高齡醫學中心
會議次別	33
會議主題	高齡病人肺部腫瘤之處置，缺乏家庭支持系統

全人醫療

跨職類

會議主題

CGA vs. Meds



問題列表	篩選與診斷	照顧計畫	追蹤狀況
心智狀態			
1.譫妄		□評估譫妄原因 □提供非藥物性治療 □建議使用合適的藥物 □提供家屬衛教與心理支持 □提供疾病與藥物諮詢衛教	□解決□進步 □不變 □惡化
2.認知功能障礙		□評估譫妄原因 □提供非藥物性的治療 □建議使用合適的藥物 □提供家屬衛教與心理支持 □提供社會資源	□解決□進步 □不變 □惡化
3.憂鬱情緒		□評估憂鬱原因 □評估認知功能 □提供非藥物治療及衛教 □提供家屬衛教與心理支持 □轉介老年精神科	□解決□進步 □不變 □惡化
4.行為問題		□評估異常行為原因 □轉介老年精神科 □轉介心理師 □提供疾病與藥物諮詢衛教	□解決□進步 □不變 □惡化
功能狀態			
5.日常生活功能近期明顯減退		□評估功能減退的原因 □轉介復健 □評估營養功能 □提供疾病與藥物諮詢衛教	□解決□進步 □不變 □惡化
6.行動力及步態障礙		□步態障礙原因 □轉介復健 □提供輔具資源□預防跌倒 □居家環境評估 □予疾病與藥物衛教 □轉介社區個管師	□解決□進步 □不變 □惡化
7.跌倒		□找出引起跌倒原因 □建議檢查骨密度 □轉介復健 □選擇合適的輔具 □居家環境評估 □提供疾病與藥物諮詢衛教	□解決□進步 □不變 □惡化
8.尿失禁/尿滯留		□找出尿失禁的原因 □尿失禁藥物治療 □解尿日誌 □評估便秘問題 □教導凱格爾運動 □提供疾病與藥物諮詢衛教	□解決□進步 □不變 □惡化
.排便問題		□評估可能引起便秘的藥物 □使用軟便藥 □規律運動 □蔬果及水分攝取 □提供疾病與藥物諮詢衛教 □腹部按摩	□解決□進步 □不變 □惡化
10.視力不良/聽力不良		□評估視力/聽力不良原因 □轉介眼/耳科 □預防跌倒 □協助申請助聽器 □提供疾病與藥物諮詢衛教	□解決□進步 □不變 □惡化
11.疼痛		□評估疼痛原因 □轉介復健 □建議使用合適的止痛藥 □提供疾病與藥物諮詢衛教	□解決□進步 □不變 □惡化
12.睡眠問題		□評估睡眠問題原因 □建議使用合適的藥物 □轉介老年精神科 □增加白天活動 □提供疾病與藥物諮詢衛教	□解決□進步 □不變 □惡化
13.營養不良		□評估體重減輕原因 □評估病患情緒問題 □轉介牙科 □轉介營養師 □定期量測體重並記錄 □提供飲食諮詢衛教	□解決□進步 □不變 □惡化
14. 脫水及電解質不平衡		□矯正體液電解質	□解決□進步 □不變 □惡化
15.壓瘡風險		□評估病患營養狀況 □轉介復健 □轉介社工 □提供皮膚照護衛教 □建議使用氣墊床	□解決□進步 □不變 □惡化
16.牙齒照顧		□衛教口牙清潔的方式 □建議使用假牙黏著劑 □轉介牙科	□解決□進步 □不變 □惡化
其他			
17.管路(餵食管/尿管/氣切/造口)		□評估脫離管路的可能性 □轉介居家護理 □提供管路照護諮詢衛教	□解決□進步 □不變 □惡化
18.多重藥物使用/精神藥物使用		□轉介高齡整合性門診 □提供非藥物治療 □轉介藥師 □提供疾病與藥物諮詢衛教	□解決□進步 □不變 □惡化
19.社會支持問題		□提供社會資源 □轉介社工 □轉介榮服處 □其他	□解決□進步 □不變 □惡化

藥物導致的老年症候群

Aging Clinical and Experimental Research
https://doi.org/10.1007/s40520-019-01239-x

ORIGINAL ARTICLE

Check for updates

The relationship between common geriatric syndromes and potentially inappropriate medication use among older adults

Pinar Kucukdagli[1] · Gulistan Bahat[1] · Ilker Bay[1] · Cihan Kilic[1] · Meryem Merve Oren[2] · Banu Ozulu Turkmen[1] · [illegible]

Polypharmacy

Received: 27 March 2019 / Accepted: [illegible] 2019

Abstract

Background/aim Polypharmacy and inappropriate medication use in older adults is a major public health problem associ[illegible]. Potentially inappropriate medication (PIM) use is based [illegible] drug–drug interaction, [illegible] was to evaluate the association between a common geriatric syndromes and PIM use among older adults.

Methods Study participants [illegible] recruited among patients admitted to Istanbul Medical School Geriatrics outpatient clinic between June 2000 and June 2[illegible] and were evaluated retrospectively by a geriatrician using the patients' records according to Beers 2012 criteria.

Results Among the 667 enrol[illegible] patients, 421 (63.1%) were women and 246 (36.9%) were men. The use of PIM was not associated with age or sex. Polypharmacy (OR 4.86, 95% CI 3.25–7.27, $p < 0.001$), malnutrition (OR 2.69, 95% CI 1.52–4.76, $p = 0.00$[illegible] depression (OR [illegible], 95% CI [illegible], $p = 0.00$[illegible] in the previous year (OR 2.24, 95% CI 1.51–3.32, $p = 0.00$[illegible], dementia (OR 1.[illegible], 95% CI 1.0[illegible], $p = 0.12$) were independently associated with the use of PIM.

Discussion/conclusions The results of our study suggest that PIM use is independently associated with presence of polypharmacy, malnutrition, depression, falls and dementia in older outpatients. Identifying the association of inappropriate medication use with common geriatric syndromes in older people can help to prevent, delay, and reduce PIM use and related adverse health outcomes.

Potential Inappropriate Medication

Geriatric Syndrome

藥物導致的老年症候群

Table 2. Geriatric Presentations Commonly Caused by Medications

Geriatric Presentation	Medication-Related Causes
Falls, dizziness, syncope	Sedatives, hypnotics, cholinesterase inhibitors, antihypertensives, antidepressants, anticholinergics[1,22]
Confusion, delirium, cognitive impairment	Antiparkinsonian, anticholinergics, anticonvulsants, antispamosdic, corticosteroids, antiarrythmics, opioids, sedatives/hypnotics[1]
Constipation	Anticholinergics, calcium, calcium channel blockers, opioids, tricyclic antidepressants[23]
Weight loss	**Side effect:** altered taste or smell Allopurinol, ACE inhibitors, antibiotics, anticholinergics, antihistamines, calcium channel blockers, levodopa, propranolol, spironolactone[23] **Side effect:** anorexia Amantadine, antibiotics, anticonvulsants, antipsychotics, benzodiazepines, digoxin, levodopa, cholinesterase inhibitors, memantine, metformin, opiates, SSRIs[23] **Side effect:** dry mouth Anticholinergics, antihistamines, clonidine, loop diuretics[23] **Side effect:** dysphagia Bisphosphonates, doxycycline, iron, NSAIDs, potassium[23] **Side effect:** nausea/vomiting Amantadine, antibiotics, bisphosphonates, digoxin, dopamine agonists, metformin, SSRIs, statins, tricyclic antidepressants[23]

Abbreviations: ACE, angiotensin-converting-enzyme; NSAID, nonsteroidal anti-inflammatory drug; SSRI, selective serotonin reuptake inhibitor.

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Acute Care for Elders, ACE

- ACE 模式為一**跨專業團隊照護**模式（interdisciplinary team model），整合各專業學科，共同合作實踐以**高齡者為中心**的照護計畫
- 理想的介入措施時機，應為於住院過程中**早期介入**，**預防功能下降**及**避免後期復健的需求**。
- 可實現醫院**以人為本**的高齡良好照護，並確保照護計畫與長者的**功能**、**認知**、**社會心理狀態**皆和目標保持一致，目的為降低高齡病人住院期間失能之發生率。

Physician

Nurse

Care coordinator

Clinical Pharmacist

Physical Therapist

Occupational therapist

Dietitian

Patient and Family

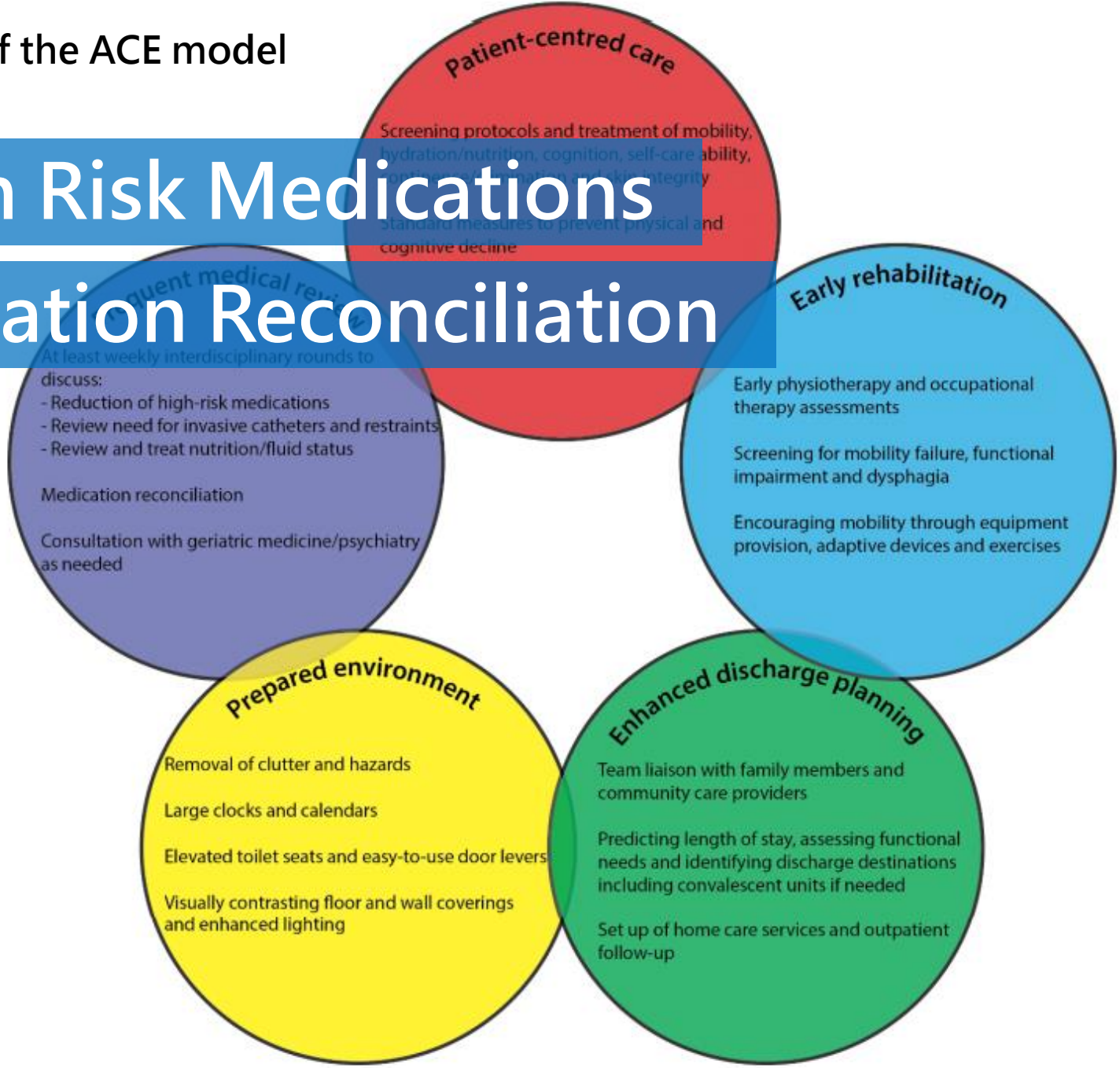
Member	Tasks/Roles
Physician and/or bedside nurse	• Admitting diagnosis or problem: key findings • Relevant past medical history • Treatment plans • Anticipated length-of-stay and postacute site of care
Bedside nurse (report)	• Assess baseline and current functional status: ADL, mobility, mood/affect, cognition, living situation, social support, nutritional status (role shared with physician) • Implement preventative/restorative protocols
Care coordinator/social worker	• Identify resources (caregiving, finances, options) • Coordinate discharge (transitions) options • Order durable medical equipment
Clinical pharmacist	• Assess medication appropriateness (potentially inappropriate medications) (shared role with physician) • Plan for monitoring of high risk medications
Physical therapist	• Mobility assessment (shared role with bedside nurse) • Transfer and gait assessment with recommendations • Determine need for skilled services (rehabilitation)
Occupational therapist	• Assess need for ADL devices/aids • Evaluate physical functioning • Determine need for skilled services (rehabilitation)
Dietitian	• Assess baseline nutritional status • Offer dietary recommendations • Work with speech therapy in assessment of oral feeding
Summary: Interdisciplinary team	• Estimate functional trajectory • Estimate length of hospital stay • Estimate postacute requirements • Review quality of care and safety • Plan for care transitions
Patient and family (medical power of attorney)	• Review goals of care, personal preferences, advance directives • Engage in self-care • Share decision-making with ACE team

Geriatrics 2018, 3, 59; doi:10.3390/geriatrics3030059

Components of the ACE model

↓ High Risk Medications

Medication Reconciliation



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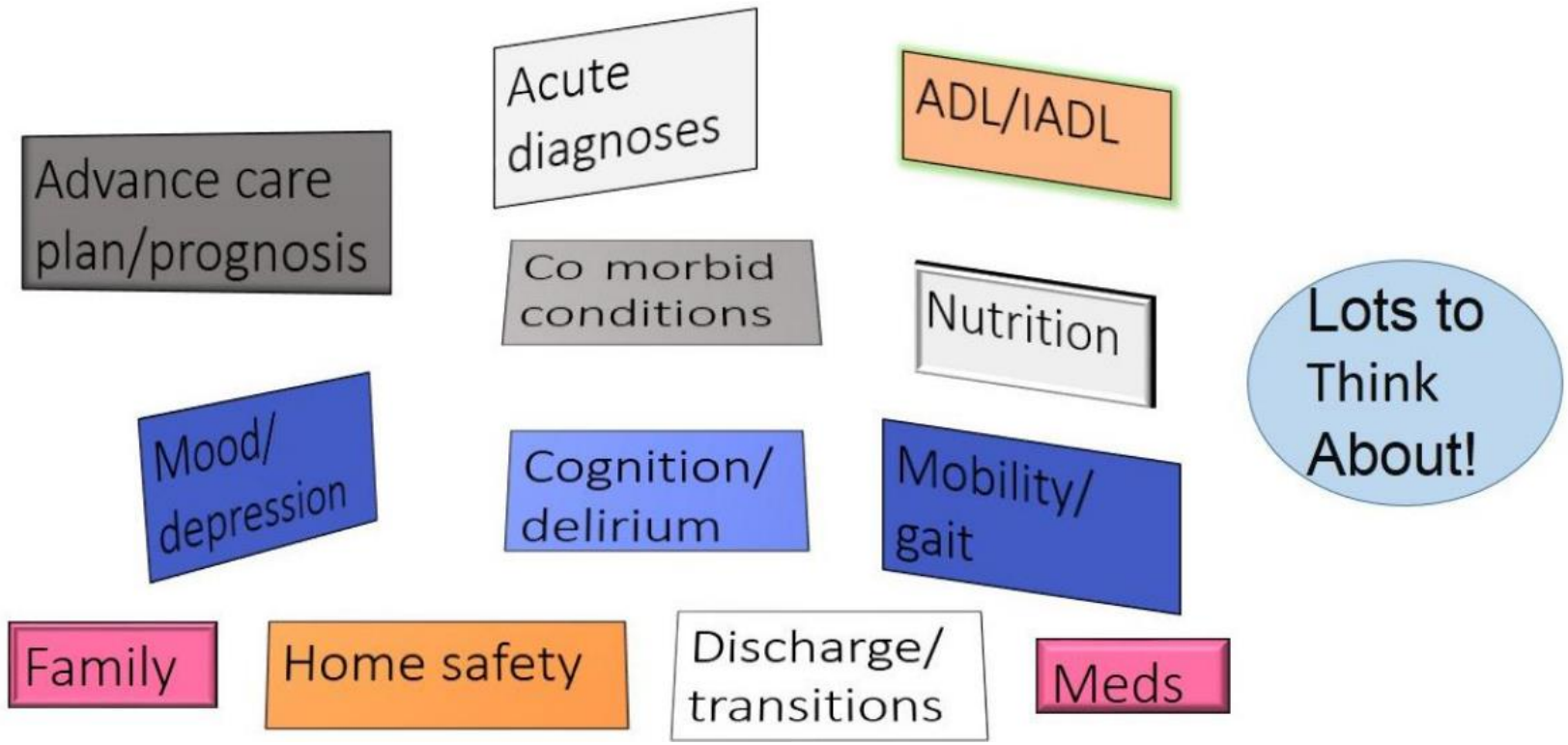
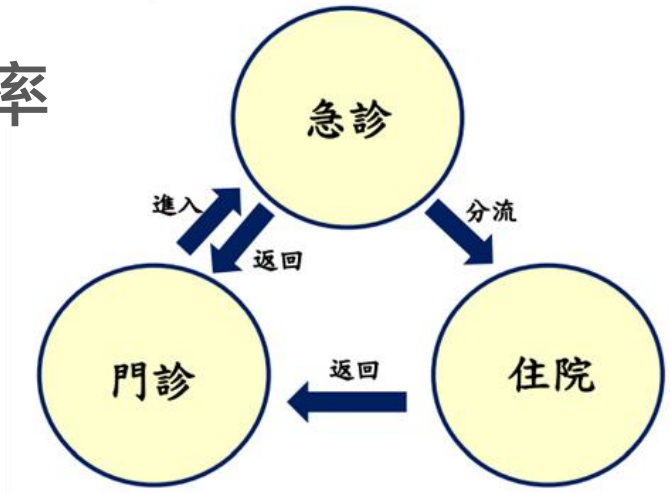
Complexity of hospitalized older adults



Geriatrics **2018**, *3*(3), 59

長者急性病友善照護模式

- 減少急診高風險長者住院率
- 減少高風險長者再急診率
- 避免高風險長者由衰弱惡化為失能
- 避免高風險長者併發症及死亡率



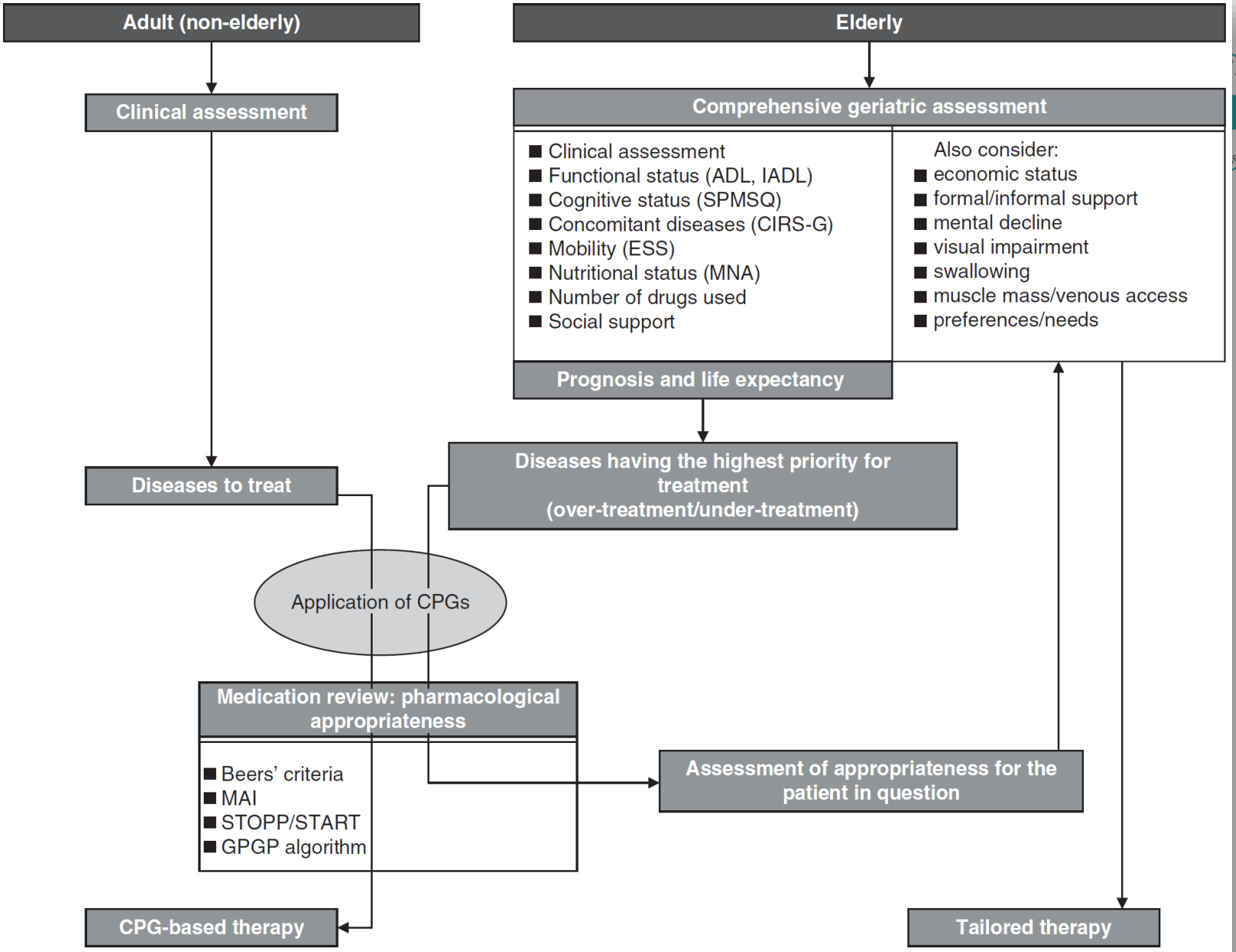


Fig. 1. Flowchart showing the role of comprehensive geriatric assessment in the prescription of appropriate pharmacological treatment in the elderly and how this approach differs from that required for the non-elderly adult. **ADL** = activities of daily living; **CIRS-G** = Cumulative Illness Rating Scale – Geriatric; **CPG** = clinical practice guideline; **ESS** = Exton-Smith Scale; **GPGP** = Good Palliative Geriatric Practice; **IADL** = instrumental ADL; **MAI** = Medication Appropriateness Index; **MNA** = Mini Nutritional Assessment; **SPMSQ** = Short Portable Mental Status Questionnaire; **START** = Screening Tool to Alert doctors to Right Treatment; **STOPP** = Screening Tool of Older Persons' Prescriptions.

The Impact on Geriatric Units of Pharmacists in the Interprofessional Teams

RESEARCH ARTICLE Open Access

Drug related problems in admitted geriatric patients: the impact of clinical pharmacist interventions

Berhane Yohannes Hailu[1*], Derebew Fikadu Berhe[2], Esayas Kebede Gudina[3], Kidu Gidey[1] and Mestawet Getachew[4]

Abstract

Background: Geriatric patients are at high risk of Drug Related Problems (DRPs) due to multi- morbidity associated polypharmacy, age related physiologic changes, pharmacokinetic and pharmacodynamics alterations. These patients often excluded from premarketing trials that can further increase the occurrence of DRPs. This study aimed to identify drug related problems and determinants in geriatric patients admitted to medical and surgical wards, and to evaluate the impact of clinical pharmacist interventions for treatment optimization.

Methods: A prospective interventional study was conducted among geriatric patients admitted to medical and surgical wards of Jimma University Medical Center from April to July 2017. Clinical pharmacists reviewed patients drug therapy, identified drug related problems and provided interventions. Data were analyzed by using SPSS statistical software version 20.0. Descriptive statistics were performed to determine the proportion of drug related problems. Logistic regression analyses were performed to identify the determinants of drug related problems.

Results: A total of 200 geriatric patients were included in the study. The mean age of the participants was 67.3 years (SD7.3). About 82% of the patients had at least one drug related problems. A total of 380 drug related problems were identified and 670 interventions were provided. For the clinical pharmacist interventions, the prescriber acceptance rate was 91.7%. Significant determinants for drug related problems were polypharmacy (adjusted odds ratio [AOR] = 4.350, 95% C.I: 1.212–9.260, $p = 0.020$) and number of comorbidities (AOR = 1.588, 95% C.I: 1.029–2.450, $p = 0.037$).

Conclusions: Drug related problems were substantially high among geriatric inpatients. Patients with polypharmacy and co-morbidities had a much higher chance of developing DRPs. Hence, special attention is needed to prevent the occurrence of DRPs in these patients. Moreover, clinical pharmacists' intervention was found to reduce DRPs in geriatric inpatients. The prescriber acceptance rate of clinical pharmacists' intervention was also substantially high.

Keywords: Geriatrics, Drug related problems, Pharmacist interventions

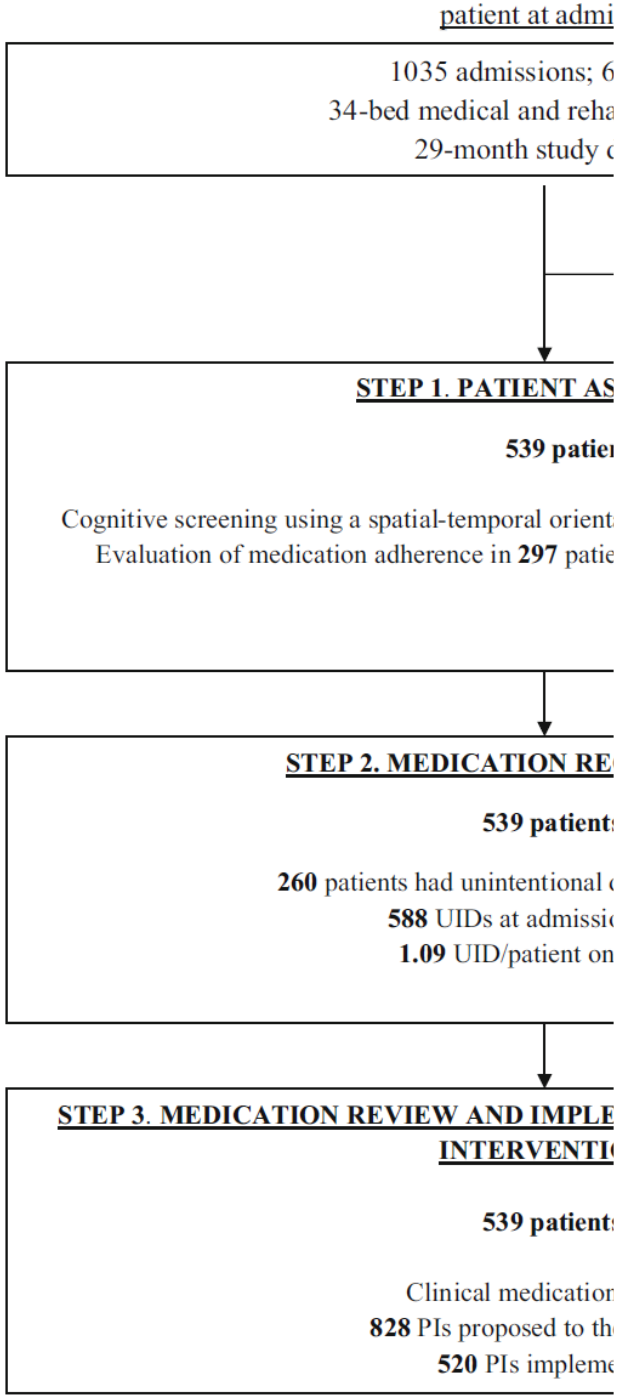
Table 3 DRP categories and number of DRPs among geriatric patients admitted from April to July to Medical and Surgical wards of JUMC, Ethiopia, 2017

Total number of DRPs =380	n (%)
Problem domains	
P1: treatment effectiveness (3 categories)	181 (47.6%)
Suboptimal effect of drug treatment	102 (56.4)
Untreated indication	69 (38.1)
No effect of drug treatment	10 (5.5)
P2: treatment safety	92 (24.2%)
Adverse drug event (possibly) occurred	92 (100)
P3: Others	107 (28.2%)
Unnecessary drug treatment	81 (75.7)
Problem with cost effective treatment	26 (24.3)
Number of drug related problems	Frequency (%)
None	37 (18.5)
One	49 (24.5)
Two	53 (26.5)
≥ three	61 (30.5)

Table 5 Causes of DRPs identified in geriatric patients admitted from April to July to Medical and Surgical wards of JUMC, Ethiopia, 2017

Cause domain (8 categories) total = 466	n (%)
C1: Drug selection causes	252 (54.1)
New indication for drug treatment	91 (36.1)
No indication for drug	52 (20.6)
Inappropriate drug according to guidelines	42 (16.7)
Contra-indicated	30 (11.9)
Inappropriate duplication of therapeutic	20 (7.9)
Inappropriate combination of drugs, or drugs and food	17 (6.8)
C2: Drug form causes	16 (3.4)
In appropriate drug form	16 (100)
C3: dose selection causes	68 (14.6)
Drug dose too high	46 (67.6)
Drug dose too low	22 (32.4)
C4: treatment duration causes	24 (5.2)
Duration of treatment too long	22 (91.7)
Duration of treatment too short	2 (8.3)
C5: dispensing causes	20 (4.3)
Prescribed drug not available	18 (90)
Prescribing error (necessary information missing)	2 (10)
C6: drug use process causes	57 (12.2)
Drug not administered at all	40 (70.2)
Drug under administered	11 (19.3)
Drug over administered at all	6 (10.5)
C7: patient related causes	22 (4.7)
Patient uses unnecessary drug	7 (31.8)
Patient administered/uses drug in a wrong way	5 (22.7)
Patient cannot afford drug	5 (22.7)
Patient unable to use drug/form as directed	5 (22.7)
C8: other causes	7 (1.5)
No or inappropriate outcome monitoring	7 (100)

BMC Geriatr **20,** 13 (2020).



Clinical medication review	*n* (%)
Drug-related problem	
Untreated indication	198 (23.9)
Supratherapeutic dosage	136 (16.4)
Non-indicated drug	128 (15.5)
Non-compliance with guidelines/contra-indication	78 (9.4)
Drug monitoring	74 (8.9)
Sub-therapeutic dosage	73 (8.8)
Adverse drug reaction	53 (6.4)
Improper administration	46 (5.6)
Drug interaction	41 (5)
Failure to receive a drug in the presence of an indication	1 (0.1)
Pharmacists' interventions	
Dose adjustment	233 (28.1)
Addition of a new drug	187 (22.6)
Discontinuation of a drug	186 (22.5)
Drug switch	99 (11.9)
Drug monitoring	95 (11.5)
Change of mode of administration	28 (3.4)
Outcomes of pharmacist interventions ($N = 828$)	
Accepted	520 (62.8)
Declined	120 (14.5)
Not evaluated	188 (22.7)
Top ten drugs cited in pharmacists' interventions	
Potassium chloride (electrolytes)	57 (7.8)
Zopiclone (non-benzodiazepine)	45 (6.2)
Furosemide (diuretic)	43 (5.9)
Fluindione (vitamin K antagonist)	38 (5.2)
Amlodipine besilate (calcium channel blocker)	28 (3.8)
Ferrous sulphate (oral iron supplement)	25 (3.4)
Tramadol hydrochloride (analgesic)	21 (2.9)
Folic acid (nutritive agent)	20 (2.7)
Amiodarone hydrochloride (antiarrhythmic)	19 (2.6)
Mianserin hydrochloride (tetracyclic antidepressant)	19 (2.6)

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RESEARCH PAPER

Medication appropriateness on an acute geriatric care unit: the impact of the removal of a clinical pharmacist

The Investigators of the MAGIC-PHARM Study, Michael Khazaka[1,2], Jeanne Laverdière[1,2], Chen Chen Li[1,2], Florence Correal[1,2], Louise Mallet[1,3], Mariane Poitras[2,4], Patrick Viet-Quoc Nguyen[2,5]

decreasing differential MAI score

Table 2. Effect of intervention (pharmacist withdrawal) on primary outcome.

	With pharmacist ($n = 208$)	Without pharmacist ($n = 97$)	Adjusted effect of intervention[a,b]	95% CI
Mean MAI score on admission	22.3	20.1		
Mean MAI score at discharge	15.3	19.9		
Difference in mean MAI scores[c]	-7.0	-0.2	9.256	(3.916–14.595)

[a]Difference between 'without pharmacist' and 'with pharmacist' group measured with the ITS analysis. [b]Adjusted for age, number of drugs on admission and Charlson Comorbidity Index score. [c]Difference between MAI score at discharge and MAI score on admission.

Objectives: to determine the impact of the removal of a clinical pharmacist from an acute geriatric ward on patients' Medication Appropriateness Index (MAI) scores, admission-related outcomes and drug burdens.

Methods: researchers consulted the archives for records of patients admitted to the geriatric care unit before and after the pharmacist's withdrawal. The primary outcome of differential MAI scores and secondary outcomes of rehospitalisations, emergency department visits, durations of hospitalisation and differential drug count were compared pre- and post-intervention. An interrupted time series analysis regression model was used for the primary outcome.

Results: a total of 305 patients admitted before ($n = 208$) and after ($n = 97$) the pharmacist's withdrawal were included in the study. The intervention had a significant impact on the primary outcome, increasing the relative differential MAI score (adjusted mean) by 9.3 points (95% confidence interval 3.9–14.6). As for the secondary outcomes, differences in admission-related outcomes were non-significant but the mean differential drug count significantly increased post-intervention from 0.02 to 1.36 ($P < 0.001$).

Conclusion: the removal of the pharmacist led to an increase in inappropriate drug prescription. Careful consideration should be given to decisions regarding the removal of the pharmacist from acute geriatric care teams.

Keywords: Medication Appropriateness Index, pharmacist, older patients, interrupted time series, administrative decision-making

改善措施/目標設定 Patient-centered	身酸痛，身體發熱、但無發燒，至診所就醫三次，拿藥症狀治療，3/18 晚上開始渾身發熱、尿量少，但測量體溫無發燒，故入於本院門診就醫，醫師建議至急診檢查，因尿量少先給予利尿劑治療後，尿量增加，抽血液培養一套、抽血檢驗值 K:5.8 mEq/L、hsCRP: 4.373 mg/dL，醫師評估後收住院治療。胸部 X-RAY: Bilateral pleural effusion，Increased insterstitial infiltration over bilateral lung fields，RML MASS，經穿刺檢查後先以 Lung Abscess 進行治療，但是仍需等待病理切片結果，是否為惡性腫瘤？若是!是否需要進一步的治療？但因病人在台灣僅有一位親人為陸配，其餘親人皆在大陸，病人又極為重聽，不論在治療或後續照護都落在案妻身上，案妻又常因為照護及對疾病的不確定性，出現哭泣、不安，也引發了團隊思考若是高齡病人肺腫瘤是否要積極的處置？如何給予照護者支持？針對以上的病程報告，團隊成員是否有問題? [redacted]主任：病人 HbA1C 控制的情形？血糖控制穩定嗎？ [redacted]住院醫師：HbA1C:6.2%，住院期間血糖不穩，指尖血糖最高曾至 500mg/dL，所以胰島素注射劑量一直進行調整中，目前 Flexpen Novorapid 20U SC TID AC 及 Levemir 10U SC QN 使用中，血糖控制已較穩定。 [redacted]藥師：個案能完全自行處理藥物。於其他醫療院所會固定領取 Finasteride 與 terazocin，作為長期待在中國時的備藥。已衛教病人勿同時使用，且 terazocin 的姿態性低血壓機率較原本使用的 terazocin 為大，需注意跌倒風險。另近期發現 Actos 偶爾不吃。已衛教需遵醫囑服用降血糖藥。案妻抱怨自從 GU 改藥後尿量減少，可能與 minirin 有關，此藥為 Beers criteria 所列之老年人潛在不適當用藥(可能造成 hyponatremia 風險)。但 GU 醫師從低劑量開立並追蹤血鈉濃度。考量住院曾發生低血鈉狀況，之後可於 GU 門診評估是否繼續使用。訪視中案妻表示個案因擔心止痛藥會損害腎臟故沒有服用 100-Neurontin cap，可先停藥並觀察疼痛狀況是否可耐受。因目前 CrCl 為 17.1 ml/min，現在已暫時停用 plavix 與 cilostazol，GI bleeding risk 應較低， 且用於 Active gastric ulcer 的 famotidine 於 CrCl 30-60 ml/min 之最大劑量為 20 mg QD, CrCl <30 mL/min 則為 20 mg QOD。故建議可考慮將 Ulstop tab 20mg 改為 1 tab QD。 [redacted]復健科主任：關於病人 Morse Fall Scale 在配分的部分有一些疑慮，若病人是扶著家具或牆壁走路，則步態或移位方面應該是異常，而探視病人時，病人有主訴右髖骨疼痛，但是無任何相關病程或影像紀錄，建議團隊要思考追行檢查或追蹤。 [redacted]醫師：好的，謝謝主任的建議。

Briefing

血糖控制

重複用藥

服藥順從性

潛在不適當用藥

藥物劑量過高

跌倒評估

任：請問目前 RML Lung mass 的處置?

住院醫師：因穿刺當時引流 560ml straw color fluid was drained，過程中病人無法忍受，而提前結束未完成整個療程，因需等待病理報告，詢問胸腔科表示，檢穿刺的檢體需等待病理報告，而初步看病人影像無淋巴方面的轉移，若確診為肺腫瘤，也是局部手術廣除或放射線治療，只是病人已高齡，需注意病人是否有因心臟功能不好，肺[illegible]考量，目前抗生素使用先以疑[illegible]肺膿瘍進行治療。

主任：若病人病理結果確診為肺腫瘤，醫療團隊需與病人及案妻進行病情說明，如手術風險、放射線治療、保守療法…等，讓病人及家屬充分瞭解治療方針，建議一個良好的[illegible]台灣僅有案妻陪伴，而案妻無其他親人可以[illegible]團隊應注意的。

Lung mass處置

醫師：病人是否有 COPD，我看病人藥物有使用 BeroduaL?

住院醫師：[illegible]COPD，因為雙肺浸潤，有吸菸史 30 年，穿刺後[illegible]胸腔科醫師建議先使用。

護理師：病人目前下床活動時仍會有活動性喘，想請問返家後氧氣設備是否有需要？

醫師：病人於穿刺後呼吸喘更為明顯，氧氣使用後有緩解，會在出院[illegible]行評估氧氣設備的需求性。

COPD?

醫師：入院前病人功能可，可以自行外出活動，因此復健對於此位長者相當重要，原本抗生素使用後，想轉介病人進行高齡衰弱 PAC[illegible]，但案妻表達想出院回家，想請問遠揚主任，關於居家復健可[illegible]？

復健科主任：[illegible]病人行走不需要輔具，但是明顯會用左側承重，經詢問也說不上為何右側使不上力，評估四肢肌力尚可，但因活動性喘，建議進行床邊復健運動，如：1.ankle pumping, heel slides and single leg raising 2. Gait training 3. Trunk balance training.

復健運動

醫師：因病人呼吸喘，最近腎功能也變差，請問營養的建議？

營養師：病人 K+偏高，有先評估平日飲食內容及習慣，三餐多由案妻備餐，病人喜[illegible]，案妻也會加強病人蔬菜的攝取量，[illegible]鉀偏高，已衛教案妻烹調方式，水分補充建議以白開水為主，因病人近期體重有上升 3-4 公斤，案妻有詢問體重的控制，也告知可以控制水分攝取在 500-800ML/DAY，每日測量體重做留下紀錄，門診可與醫師進行討論。

營養建議

醫師：查房時，發現案妻一談及病人病情便流淚，且常提及在台灣無其他親人，往年都會有半年的時間留在大陸與親友作伴，今年因新冠肺炎影響無法返大陸，情緒相當低落，會診社工師介入，請問輔導結果?

發現照護者心理壓力

Poor psychosocial support system

照護者健康問題

照護者心理問題

釐清心理壓力來源

社工師：病人原於診所看診，因為一直未見好轉，聽診所醫師建議到本院求治，對本院治療的期待相當大，但因病人病況一直不穩定且又接受多項檢查，每次檢查可能就伴隨一種新的疾病出現，讓案妻相當無助，也讓案妻自責到臺中榮總就醫是否是件錯誤的選擇；個案雙親已歿，在臺灣無親屬，有一弟(已歿)一妹成家於中國，案弟育有四子皆在個案協助下立業成家，姪孫子輩共 6 男 2 女，偶爾聯繫而已久未見面。個案與案妻每年約有半年以上的時間在中國探親，在中國置有房產，偶爾住於案妹家，因個案待在國內時間一年未達 183 天，故無法取得福利補助。傾聽個案和案妻各自的擔心，同理個案不希望自己和太太受苦和案妻對於個案治療方向的焦慮，充權個案和案妻可為醫療決策多和醫師討論、主動表達。

理師：可以感覺案妻的照護壓力，及夫妻間情感的緊密，可能案妻生活背景的不同對於台灣的醫療環境模式的接受度不佳，臨床端更要加強說明與衛教，給予充分的情緒支持。

藥師：

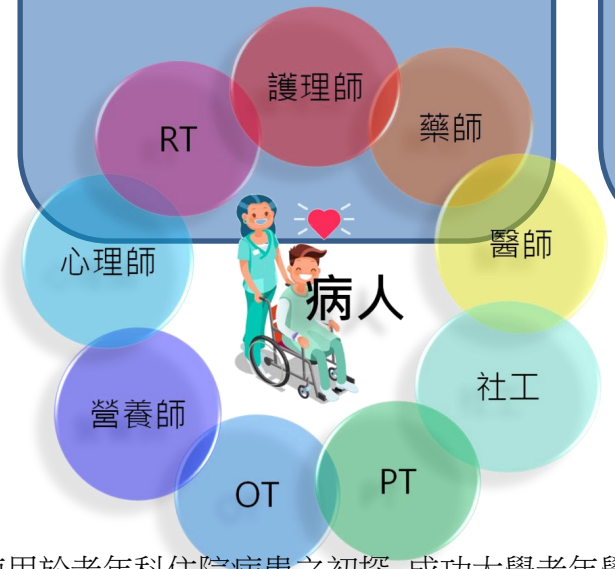
目前個案與妻子同住，多半時間都在中國。妻子表示過去曾因肺癌接受過化療與標靶治療，近期被診斷患有高血壓，有開立藥物但沒有按時服用。之後個案需要被照護的強度提高，案妻的負擔加重，加上以目前個案身體病況恐無法於近期回中國，需要心靈層面的輔導。


護理師
RT
藥師
心理師
醫師
病人
營養師
社工
OT
PT

周全性老年人藥物評估

適應症
劑量頻次用法
重複藥物
管灌不宜磨粉藥物
肝腎功能劑量調整
治療時間
高風險藥物用藥衛教
藥物諮詢

抗生素處方評估
藥物不良反應
藥物交互作用
藥物血中濃度監測
藥物辨識



日常生活與活動功能
視力聽力
精神與認知功能
管路照護與藥物
老年症候群與藥物
遵醫囑性
藥物處理能力
老人潛在不適當用藥
主要照護者

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Beers Criteria
口袋版

襲來的銀色海嘯

惱人的多重用藥

先來些Beer

Good Bye! 老人不適當用藥