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Medication Errors: Older Patients & Their Caregivers

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HRB
Health Research Board

SEVENTH FRAMEWORK
PROGRAMME

Common Medication Errors in Older People

- Prescribing errors
  - Polypharmacy (caregivers sometimes complicit)
  - Potentially inappropriate medications (PIMs)
  - Potential prescribing omissions (PPOs)
  - Failure to recognise need for palliative pharmacotherapy
- Reconciliation errors
- Compliance errors
  - Packaging, presentation, formulation
  - Failure to detect cognitive problems
- Economic errors
  - Failure to prescribe generics
  - Focus of ‘new, improved’ drugs

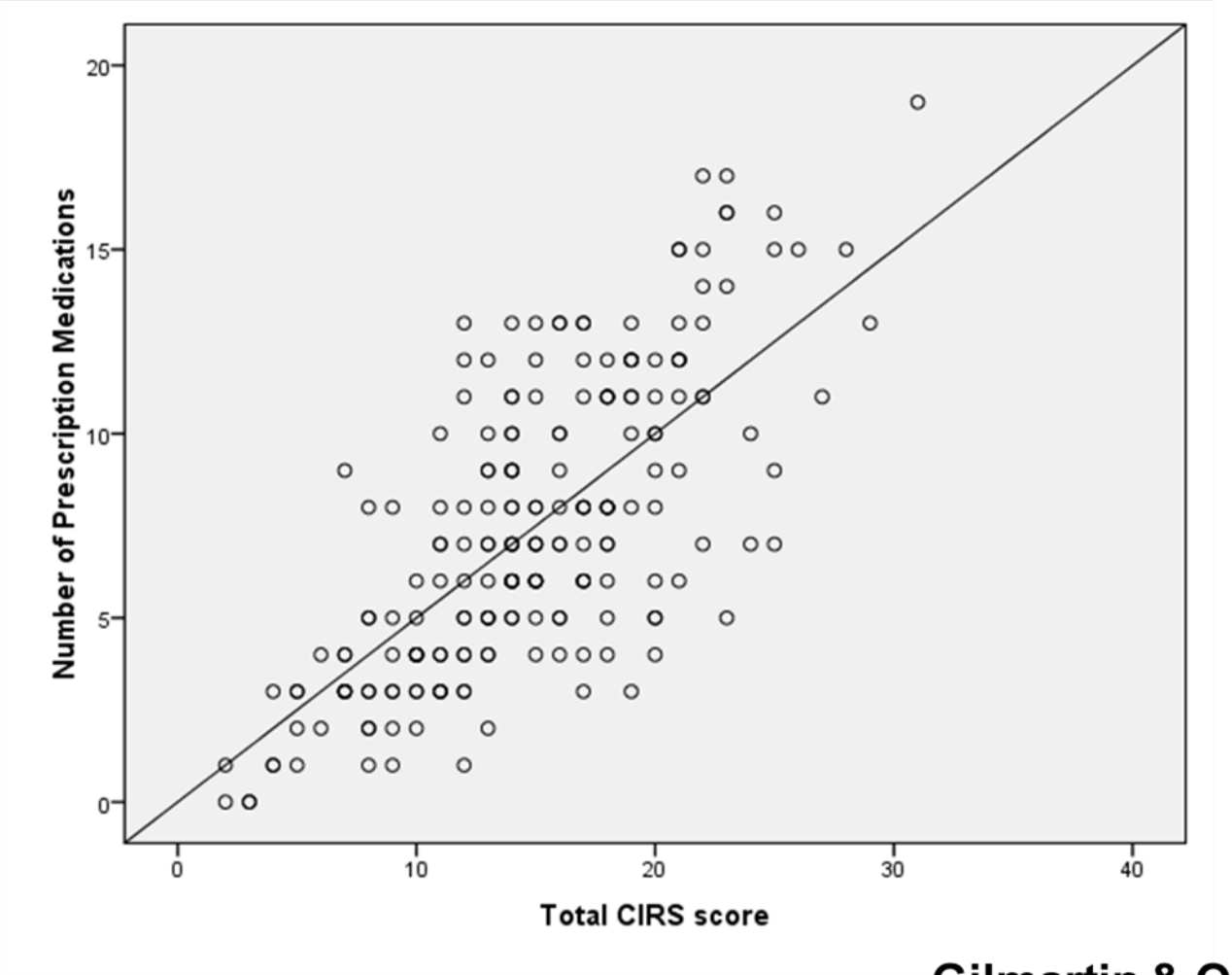
How to counteract medication errors in older people

- Ensure correct drug indications
- Ensure no absolute drug contraindications
- Minimize adverse drug-drug, drug-disease interactions
- Minimize Potentially Inappropriate Medications (PIM's)
- Minimize Potential Prescribing Omissions (PPO's)
- Identify older people at high risk of and suffering the symptoms of ADR's, ADE's
- Identify older people who need palliative Rx
- Translate all medications to generics
- Ensure best value drug selection (BVDS)
- Maximize overall medication appropriateness
- Ensure optimal formulation, packaging, presentation
- Counsel patient and (where appropriate) caregiver

Unifying Theory/Concept

Polypharmacy **is a core problem i.e. inappropriate over-prescribing in response to complex comorbidity**

Multimorbidity and Polypharmacy are *not* independent variables



R = 0.726

Gilmartin & O'Mahony, 2012

Polypharmacy: new definition

- "The inappropriate pharmacotherapeutic response from doctors to the presence of multimorbidity, usually in an older person, that results in heightened risk of adverse drug reactions and adverse drug events. The presence of 8 or more daily medicines represents a serious risk of adverse drug-related morbidity, which should trigger corrective action."

O'Mahony, 2012.

Adverse Drug Reaction (ADR)

- "Any noxious, unintended and undesired effect of a drug, excluding therapeutic failures, intentional or accidental poisoning, and drug abuse."

  WHO 1969

  e.g. Acute haemorrhagic gastritis 48 hours after starting diclofenac 50 mg t.d.s. with no prior history of PUD and no other drug as a likely cause.

- Severe ADR →
  - Immediate discontinuation of suspect drug
  - Required resuscitative or antidote treatment
  - Caused or contributed to hospitalization
  - Caused or contributed to death

ADR Risk Factors

- Age > 65
- Female > Male
- Polypharmacy (> 6 medicines/day)
- Multimorbid illness (≥ 4 chronic diseases)
- Chronic liver disease
- Acute, chronic kidney disease (eGFR < 60 ml/min/1.73m^2)
- Chronic heart failure
- Previous ADR
- Certain drugs: insulin, anticoagulants, neuroleptics, oral hypoglycaemic agents, non-steroidal anti-inflammatories

ADR epidemiology

- 6% of hospital admissions
- 4% of hospital bed-days
- Hospital stay in ADR patients 8% longer
- 0.3% of ADRs are fatal
- Mortality in ADR patients increased x 19 times
- Incidence rate *increasing* with global ageing
- Recent USA statistics: 5th highest cause of death
- Approx. 3% of all deaths in Sweden
- Mortality in older patients increased 7 times
- Hospital admissions for ADRs increasing

ADR's in elderly patients: Cork University Hospital

- Prospective study design: July – Nov 2010
- Eligibility: patients ≥ 65 years admitted via ED
- Patients reviewed admission→ discharge
- ADR detection: patient interview, case-note analysis, physician consultation, review of laboratory and other investigations
- WHO-UMC causality criteria
- Discharge letters requested on all in-patients who had an in-hospital ADR (n=135)
- All 135 index hospital admissions were reviewed on the Hospital In-Patient Enquiry portal.

ADR's in hospitalized older people

- 513 hospitalised patients; ≥ 65 years
- 135 in-hospital ADR's identified (affecting 26% of patients)
- 95% were defined as certain/probable (WHO-UMC criteria)

Drug/Drug Class	Adverse Drug Reaction	No. (%)
Diuretics	Acute kidney injury/ electrolyte disturbance	45 (25%)
Benzodiazepines	Fall(s)	32 (18%)
Opiates	Acute confusion/ falls/ sedation/constipation	32 (18%)
Beta-blockers	Symptomatic bradycardia/ Orthostatic hypotension	16 (9%)
Anti-hypertensive's (excluding diuretics + beta blockers)	Orthostatic hypotension/ Acute Kidney Injury/Hyperkalemia	14 (7.8%)
NSAID's (excluding Aspirin)	Gastritis/peptic ulceration/ acute kidney injury	10 (5.6%)
Warfarin	Haemorrhage	8 (4.5%)
Anti-platelets	Haemorrhage/gastritis	6 (3.3%)
Neuroleptics	Falls/parkinsonism	3 (1.6%)
Selective Serotonin Reuptake Inhibitors	Hyponatraemia	3 (1.6%)
Antibiotics (Cephalosporins)	Clostridium difficile colitis	3 (1.6%)

Recording of ADR's in hospital

HIPE coded data

- 135 records analysed (100%)
- 27/135 (20%) detailed the medication and associated ADR

Hospital Discharge summary

- 124/135 (92%) discharge letters analysed
- 24/124 (19%) reported that patient had an ADR in hospital
- 8/24 :detailed description of the ADR
- 16/24: detailed the drug only but not the ADR

Insufficient recording of ADR's by hospitals → Grossly under-reported rate of ADR's by Irish Medicines Board.

Can ADR risk be predicted?

Multi-Variate Analysis Variable	Odds Ratio	95% Confidence Interval		p -value
		Lower	Upper	
Age (years) 65-74 75-84 ≥ 85	 2.12 2.22	 1.22 1.68	 3.69 4.23	**0.015** **0.007** **0.015**
Renal Failure (eGFR < 60)	1.81	1.12	2.92	**0.015**
Liver Disease	1.86	0.90	3.84	0.090
Number of STOPP medications	2.40	1.26	4.59	**0.008**
Number of Medications	1.09	1.02	1.17	**0.006**
Assistance ≥ 1 activity of daily living	0.75	0.45	1.26	0.290

O'Connor MN et al., 2012

Evidence-based ADR prevention

- **Pharmacist-led medication review** (17 studies):
  odds ratio 0.64 (95% CI: 0.43 – 0.96) prevents ADR-related admissions

Royal S et al., *Qual Saf Health Care* 2005
(Systematic review and meta-analysis)

- **Outpatient geriatric clinic care using Comprehensive Geriatric Assessment (one RCT)**:
  odds ratio 0.65 (95% CI: 0.45 – 0.93) prevents serious ADRs *(outside hospital)*

Schmader KE et al., *Am J Med* 2004
(Randomized controlled trial)

- **In-patient structured education programme on ADR recognition, prevention (one RCT in the rehabilitation setting):**
  odds ratio: 0.61 (95% CI not cited) prevents ADRs *(in hospital)*

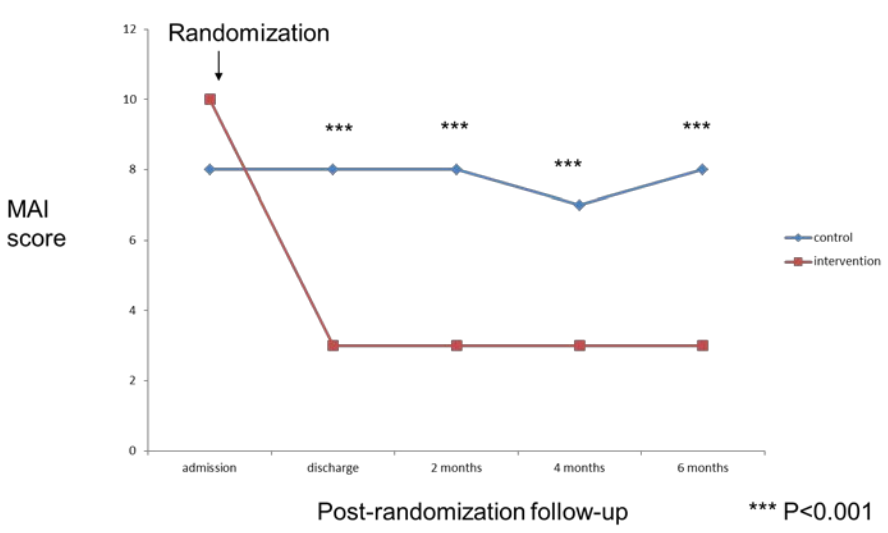
Trivalle C et al., *J Nutr Aging Health* 2010
(Randomized controlled trial)

Prevention of Potentially Inappropriate Prescribing for Elderly Patients: A Randomized Controlled Trial Using STOPP/START Criteria

PF Gallagher[1], MN O'Connor[1] and D O'Mahony[1,2]

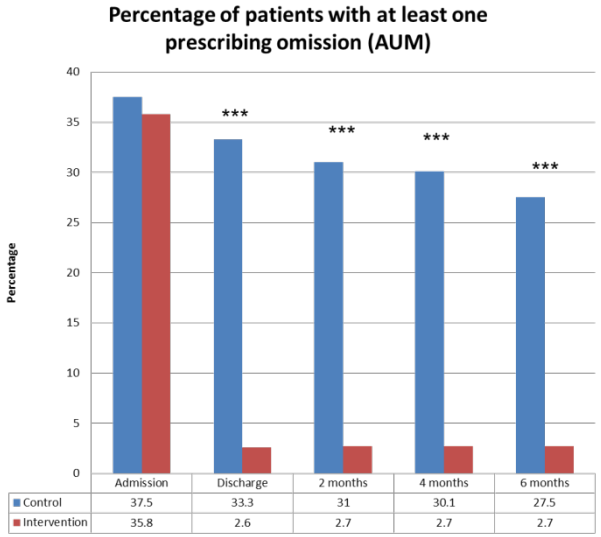
Clinical Pharmacology & Therapeutics (Nature) 2011; 41(6): 841-54.

Effect of STOPP on Medication Appropriateness



*** P<0.001

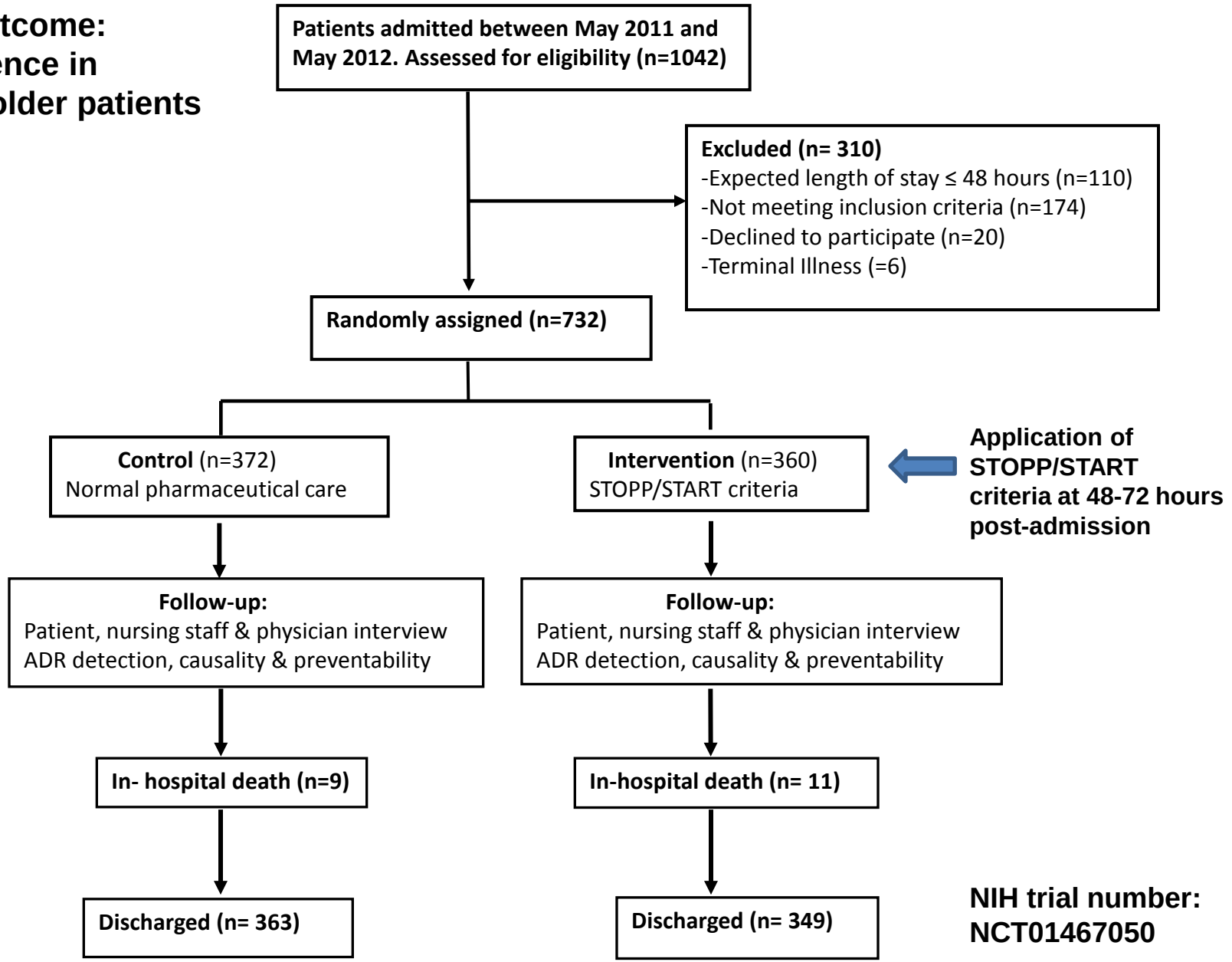
Effect of START on Omission of Appropriate Medications



*** P< 0.001

STOPP/START RCT

Primary outcome:
ADR incidence in acutely ill older patients



NIH trial number: NCT01467050

ADR's caused by medications listed in STOPP/START criteria

Study Arm	Number (%) of patients with at least one instance of IP according to STOPP/START criteria at randomization	Number (%) of ADR's attributable to medications listed in STOPP/START criteria	Number (%) of ADR's *not* attributable to medications listed in STOPP/START	Total number of ADR's
Control (n = 372)	158 (42.5%)	51 (57%)	38 (43%)	89
Intervention (n = 360)	176 (48.9%)	15 (33%)	30 (66%)	45

i.e. ADR rate in Intervention Group = 23.9%
vs. ADR rate in control Group = 12.5%
Absolute Risk Reduction = 11.4%; NNT = 9

Adjusting for number of drugs, PIMs, renal failure, liver disease, heart failure, age, dementia and falls…….
ADR risk Odds Ratio = 0.43 (CI: 0.28 - 0.67)

Prescribing Optimization: Starting with a ‘blank canvas’

Drug indications

Drug-drug interaction

Drug-disease interaction

Medications reconciliation

Potential inappropriateness

Potential prescribing omissions

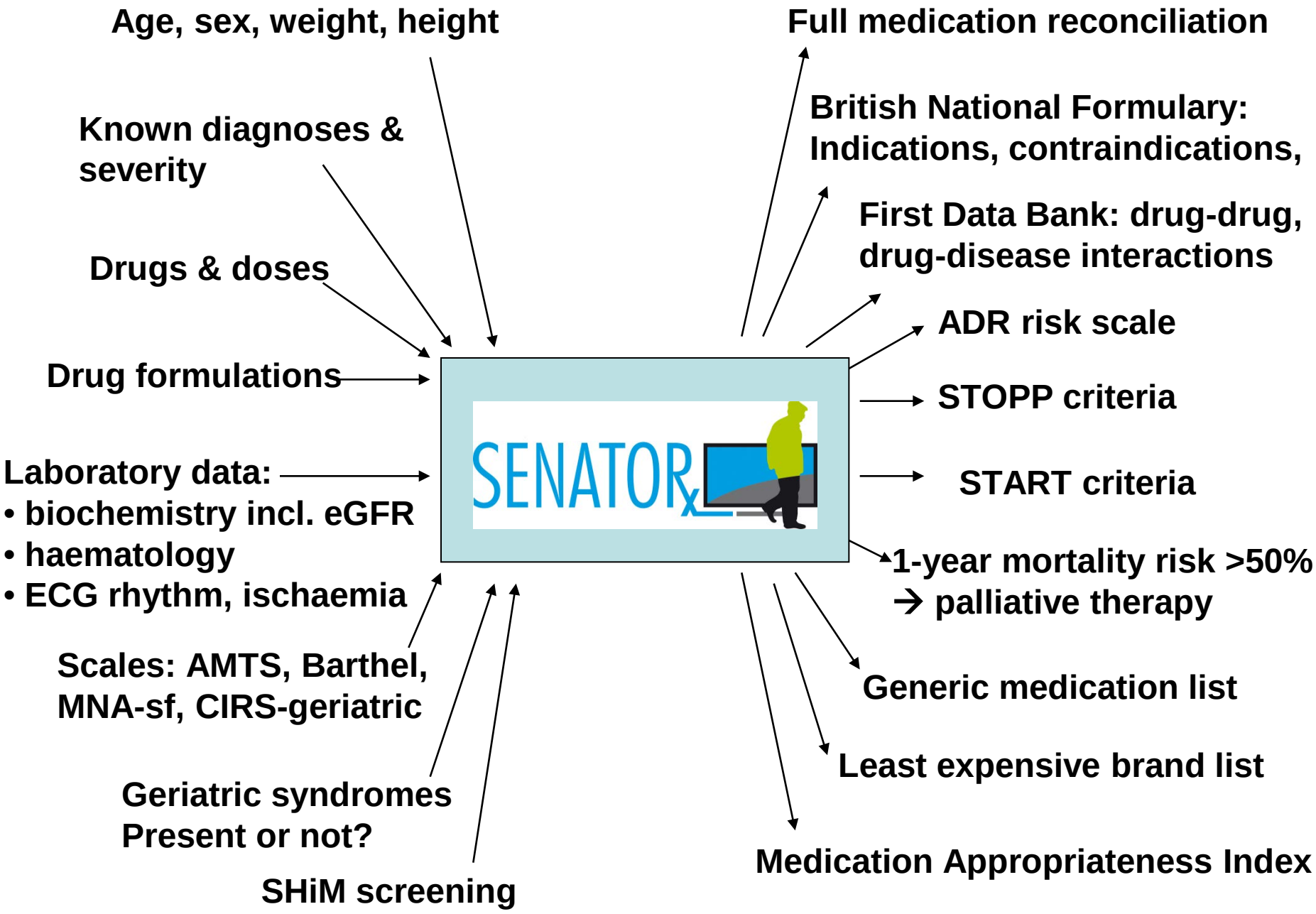
ADR/ADE risk factors

Indications for palliative drug therapy

Generic drug list

Cheapest brands

Assessment of overall medication appropriateness

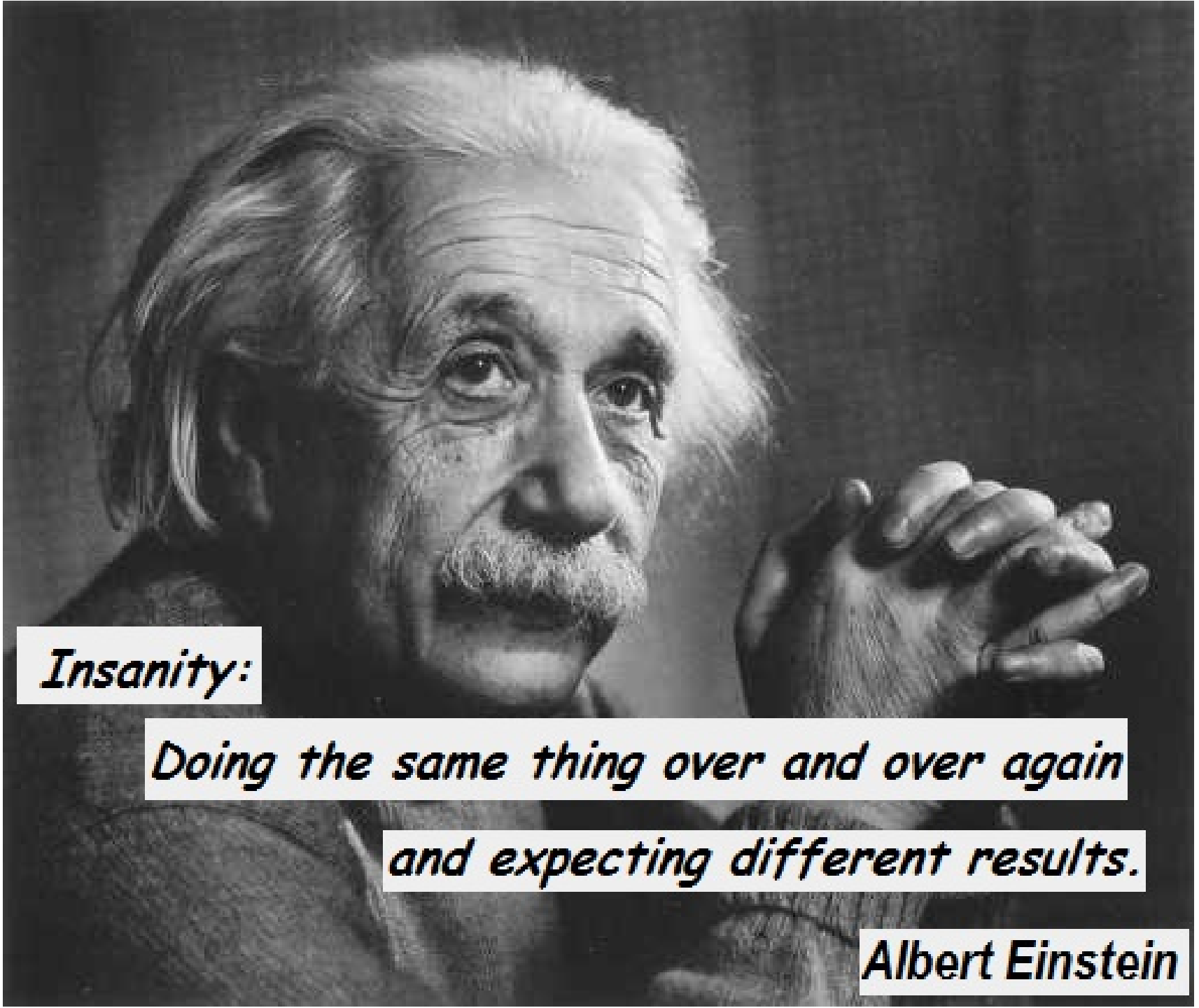

Age, sex, weight, height
Known diagnoses & severity
Drugs & doses
Drug formulations
Laboratory data:
• biochemistry incl. eGFR
• haematology
• ECG rhythm, ischaemia
Scales: AMTS, Barthel, MNA-sf, CIRS-geriatric
Geriatric syndromes Present or not?
SHiM screening
SENATORx
Full medication reconciliation
British National Formulary: Indications, contraindications,
First Data Bank: drug-drug, drug-disease interactions
ADR risk scale
STOPP criteria
START criteria
1-year mortality risk >50%
→ palliative therapy
Generic medication list
Least expensive brand list
Medication Appropriateness Index

KEEP IT SIMPLE!
THERE IS MORE TO LIFE THAN TAKING TABLETS.

DON’T ADD TO CAREGIVER BURDEN BY COMPLEX DRUG REGIMENS

Summary

- Prevention of ADR's is vital, most ADR's are predictable.
- Avoidance of medication errors/medication optimization in multimorbid older people is often complex and challenging ……i.e. *there are no simple solutions*.
- Polypharmacy, Inappropriate Prescribing, ADR's not economically sustainable.
- Evidence-based interventions exist.
- Systematic scrutiny of medication essential.
- Co-ordinated, integrated efforts of prescribers and pharmacists is essential for medication optimization.
- EU-wide investment in R&D of effective and efficient pharmacotherapy optimization software systems is needed.


Insanity:
Doing the same thing over and over again
and expecting different results.
Albert Einstein