

AI and big data – actionable analytics in clinical practice

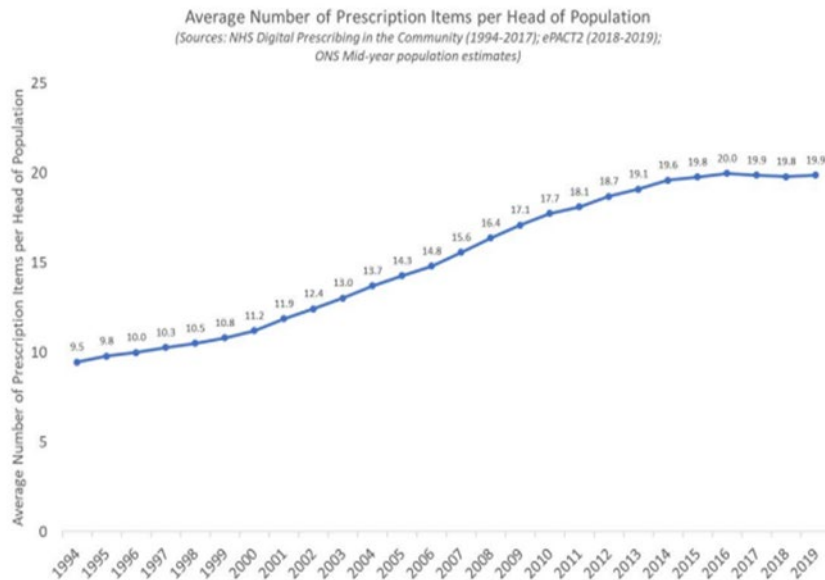
Dr. Lauren Walker

Clinical Senior Lecturer, Clinical Pharmacology &
Therapeutics/Internal Medicine, University of Liverpool

Conflict of Interest

In relation to this presentation, I declare that I have no conflicts of interest
NIHR AIM funded DynAIRx project

Polypharmacy, overprescribing, deprescribing, potentially inappropriate polypharmacy, complex polypharmacy, problematic polypharmacy.....



Barriers in the prescribing system:

1. Hospital discharge letters
2. Clinical indications
3. Transfer of care
4. Guidelines/QoF
5. Repeat Rx

Department
of Health &
Social Care

Good for you, good for us, good for everybody

A plan to reduce overprescribing to make patient care better and safer, support the NHS, and reduce carbon emissions

Published 22 September 2021

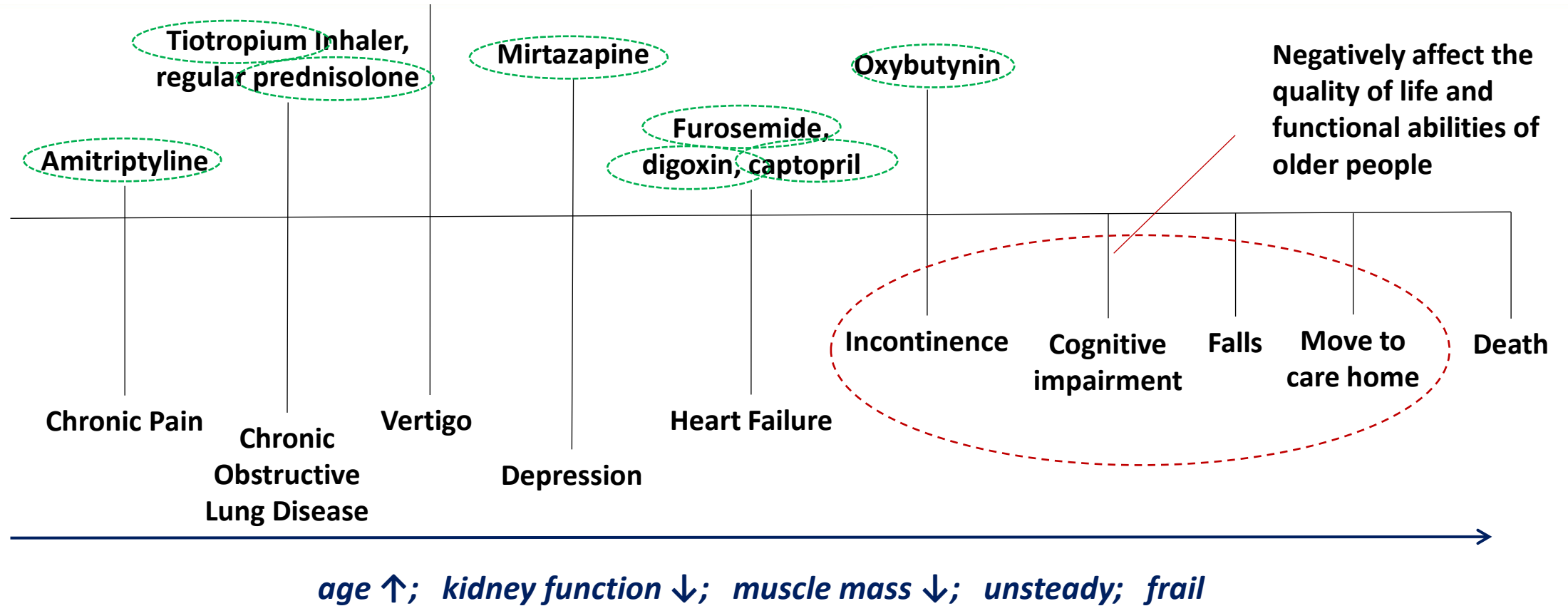
*A person taking 10+ medications is **300%** more likely to be admitted to hospital because of an ADR*

Figure 1: The Average Number of Prescription Items per Head of Population by year 1994-2019.

Accumulation of medicines risks

Escalating anticholinergic burden across the life course

Amitriptyline 50mg nocte
Trimbow inh, tiotropium inh
Prednisolone 30mg 7/7 reducing
Mirtazapine 30mg OD
Furosemide 40mg BD
Digoxin 125 micrograms OD
Captopril 25mg TDS
Oxybutynin 10mg OD



Anticholinergic burden

PLWH with high ACB performed worse on tests of learning and executive function compared with HIV- with high ACB

- <http://www.acbcalc.com/>
- score ≥ 3 higher risk of confusion, falls, delirium and death (>65's)
- Every additional ACB point increases risk of death by 26%
- ACB3 **amitriptyline, chlorphenamine, olanzapine, oxybutynin, paroxetine, quetiapine**
- Common – prednisolone, furosemide, anti-histamines, tricyclics
- Stop, dose reduce, exchange (quetiapine (3) -> risperidone (1) in AD, oxybutynin (3) -> mirabegron (0))

- Ageing HIV+ population
- ~50% HIV+ >50yrs and ~90% of individuals >50yrs have been living with HIV for the majority of their life
- HIV care will intersect routinely with geriatric medicine
- PLWH LTC's = diabetes, CVD, osteoporosis, CKD, COPD
- HIV immunosenescence ?accelerated ageing

What do we mean by “big data”?

- Volume, Velocity, Variety, Veracity
- EHRs
- Structured, **coded** datasets (Read, Med ID, ICD-10, SNOMED)
 - Unstructured (images, ECGs, free-text)
- Requires a **Trusted Research Environment**, linked de-identified health records
- USA examples:
 - MIMIC-III database (hospital, Boston)
 - Veterans Aging Cohort Study (VACS), national VA EMR 1997 –
 - >40,000 HIV-positive Veteran participants and a 1:2 (>80,000) age/race/site matched sample of uninfected control participants
 - >7,000 VACS 9 patients (half HIV-positive participants, half HIV-negative control participants) (since 2002)

VOLUME

- Largest primary care database in the world, anonymised UK eHRs
- Longitudinal data since 1987
- ~4.4 million active (alive, currently registered) patients meet quality criteria
- Median range of f/u 9-12yrs, ¼ have >20yrs f/u

VELOCITY

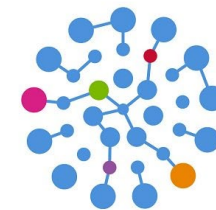
- monthly database updates online to approved research groups

VARIETY (complexity)

- Link to hospitalization data, death, cancer, deprivation

VERACITY

- Driven by Quality and Outcomes Framework (QOF) indicators
- 25 NICE guidance documents covering 12 disease areas have been developed using data derived from CPRD



CPRD

Volume

- 96k disease codes
- data files contain millions of rows of data
- Drugs recorded by product ID and BNF code
- Numerical data on results, observations
- Free text not captured

Bias in CPRD

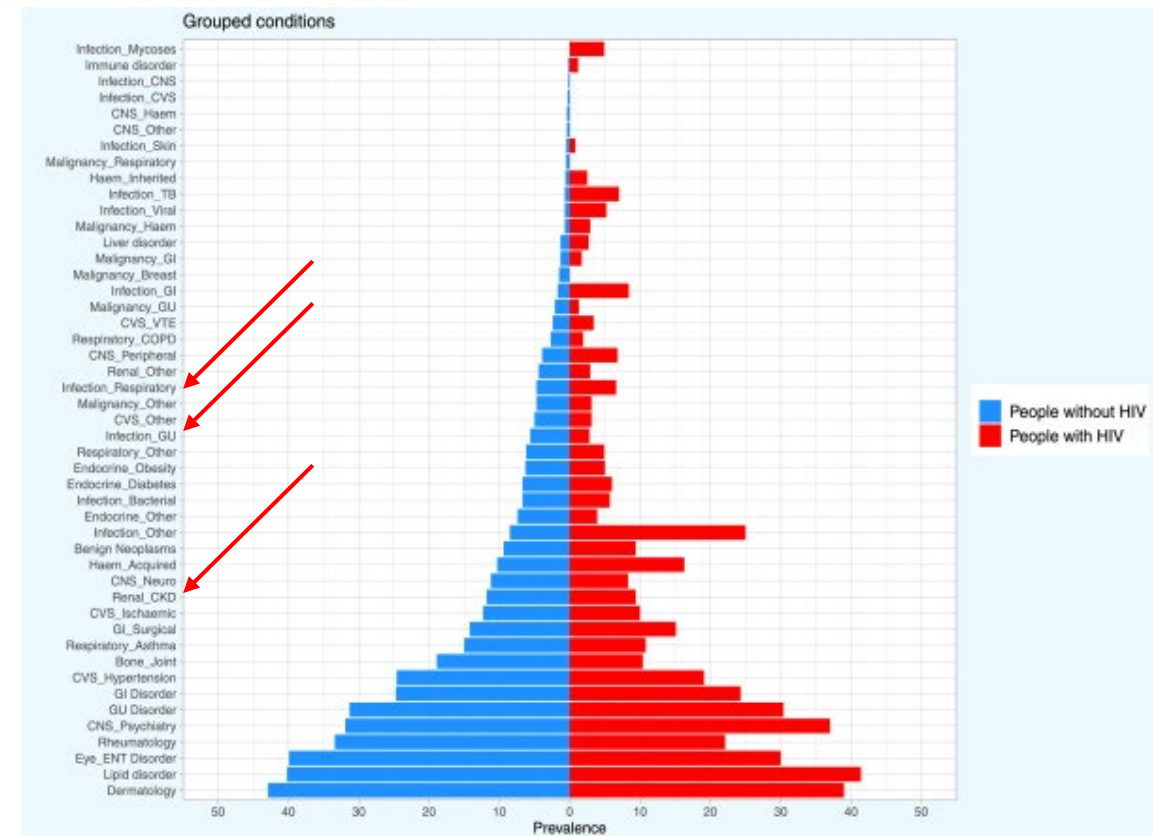
- Missing data - NHS Health checks introduced 2009 – lipid profiling, BP, BMI in people age 40-74
- NHSE screening programmes
- Absence of sexual health data, prisoners, homeless patients
- Absence of code = absence of disease

Cost

What's the
downside?

- CALIBER first large-scale analysis of comorbid health conditions in adults with HIV, snapshot (2015)
- Sexual health data is excluded from CPRD
- Not mandatory to disclose HIV status to GP, under-reporting
- *No temporal associations, not a longitudinal analysis, relationships between drugs-diseases-drugs not examined*

Bipolar, substance misuse, depression



Interactions with Lenacapavir (Sunlenca®) now available - [click here](#) for more details

Looking for interactions with COVID-19 therapies, including Paxlovid? [Click here for covid19-druginteractions.org](#)

HIV Drugs	Co-medications	Drug Interactions
Search HIV drugs... <input type="text"/>	quet <input type="text"/>	<input type="checkbox"/> Check HIV/ HIV drug interactions
<input type="radio"/> A-Z <input type="radio"/> Class <input type="radio"/> Trade	<input type="radio"/> A-Z <input type="radio"/> Class <input type="radio"/> Trade	Switch to table view
<input checked="" type="checkbox"/> Dolutedgravir/Abacavir/Lamivudine (DTG/ABC/3TC)	<input checked="" type="checkbox"/> Carbamazepine	Potential Interaction
<input type="checkbox"/> Abacavir (ABC)	<input checked="" type="checkbox"/> Quetiapine	Dolutedgravir/Abacavir/Lamivudine (DTG/ABC/3TC)
<input type="checkbox"/> Abuvirtide (ABT)	<input checked="" type="checkbox"/> Carbamazepine	Carbamazepine
<input type="checkbox"/> Atazanavir alone (ATV)	<input type="checkbox"/> Desogestrel (COC)	Look for alternatives →
<input type="checkbox"/> Atazanavir/cobicistat (ATV/c)	<input type="checkbox"/> Ethinylestradiol	More Info v
<input type="checkbox"/> Atazanavir + ritonavir (ATV/r)	<input checked="" type="checkbox"/> Quetiapine	No Interaction Expected
<input type="checkbox"/> Bictegravir/Emtricitabine/Tenofovir alafenamide (BIC/FTC/TAF)		Dolutedgravir/Abacavir/Lamivudine (DTG/ABC/3TC)
		Quetiapine

Drug	Interaction Status
Carbamazepine	Orange square
Clonazepam	Green diamond
Eslicarbazepine	Orange square
Ethosuximide	Green diamond
Gabapentin	Green diamond
Lacosamide	Green diamond
Lamotrigine	Green diamond
Levetiracetam	Green diamond
Oxcarbazepine	Orange square
Phenobarbital (Phenobarbitone)	Orange square
Phenytoin	Orange square
Pregabalin	Green diamond
Primidone	Orange square
Sodium valproate	Green diamond
Tiagabine	Green diamond
Topiramate	Green diamond
Valproate semisodium (Divalproex sodium)	Green diamond
Valproic acid	Green diamond



Carbamazepine Interactions

[View carbamazepine drug monograph](#)

Carbamazepine has the following interaction information:

Filter by drug name: [Filter](#) Sorted by: Name | [Sort by: Severity](#)

1 interaction for:

[Quetiapine](#)

Carbamazepine is predicted to decrease the exposure to Quetiapine. Manufacturer advises consider alternatives.

Severity: Moderate Evidence: Study

24F HIV/Schiz/epilepsy

- DTG/CBZ reduces DTG levels, needs TDM and inc DTG dose
- CBZ/Quet reduces levels of quet

Medicines optimisation – system

- R1. NHSX ... records can be safely shared and accessed across care settings ... interoperable consolidated patient medication record ... mandatory standards for discharge letters.
- R2. NHSX and NHS Digital ... clinical indications must be routinely recorded at the point of prescribing
- R4. MHRA should work with the pharmaceutical industry and clinicians ... post marketing surveillance arrangements to generate information that supports deprescribing.
- R5. ... culturally competent, evidence-based alternatives to a medicine
- R8. NHS England and NHS Improvement should expand the use of SMRs in primary care networks to **benefit those target groups most at risk of overprescribing**... Appointments must be long enough to allow for shared decision-making – typically at least 30 minutes ... social prescribing link workers ...

Thanks for listening, any questions?



Autumn Conference
Friday 25th November 2022
ROYAL COLLEGE OF PHYSICIANS,
LONDON



www.bhiva.org

#BHIVA22 Follow us on social media

