Quality Prescribing Indicators development and other considerations

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Declaration of interests - none

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Key points

- Assessment of the quality use of medicines requires valid and reliable indicators

- Quality indicators are **not** a magic bullet

- Quality indicators are important tools as part of quality improvement initiatives such as continuous professional education, benchmarking and disease management programmes.

- Prescribing quality indicators should be developed using systematic methods such as evidence

- Quality indicators should be reliable, valid and take implementation issues into account

The **quality of prescribing** has been measured for many years by other names such as:

- measures of rational prescribing

- standards of prescribing performance

- indicators of appropriateness

- indicators of quality or cost minimisation

- desired responses

- quality markers

Indicators (%)

Number of X-rays of patients with low back pain in general practice (numerator) / number of patients with low back pain in general practice (denominator)= xx.x%

- By defining an indicator and expressing it with a precise numerator and denominator the quality of care can be described explicitly as a percentage between 0 and 100.

- Transforming indicators into a percentage allows comparison between care providers.

Indicators (rate)

Number of X-rays of patients with low back pain in general practice (numerator) / number of patients living in area provided healthcare (denominator)= yy.y per 1,000 inhabitants

- Transforming indicators into a rate allows comparison between care providers.

Indicators (rate)

Number of X-rays of patients with low back pain in general practice (numerator) / number of patients living in area provided healthcare (denominator)= yy.y per 1,000 inhabitants **per time period**

- Transforming indicators into a rate allows comparison between care providers.
- **Requires one additional part to the denominator – the timeframe of the measurement (e.g. per month)**

Monitoring quality of prescribing

Patient-orientated indicators

Disease-orientated indicators

Drug-orientated indicators *(patient level data)*

Drug-orientated indicators (*aggregate data*)

Volume & spend

Terminology

Drug orientated indicator using **aggregate data**

Total UTI antibiotic DDDs/1,000 inhabitants per day

Drug orientated indicator using **patient-level data**

% of women prescribed UTI antibiotics who received a
	3-day course of UTI antibiotics

Disease orientated indicator using **patient-level data**

% of women with UTI prescribed antibiotics who receive
	the recommended antibiotics

Definitions: quality indicator

"A measurable element of performance for which there is evidence or consensus that it can be used to assess the quality, and hence change in the quality, of care provided" : Lawrence and Olesen 1997

"A measurable element of **prescribing** performance for which there is evidence or consensus that it can be used to assess quality, and hence in changing the quality of care provided" EURO-DURG 2004

Definitions: quality prescribing

Indicators designed to assess quality should adhere to a clear definition of quality of care and include key measurement attributes with an *a priori* clear definition and purpose for use.

"patients receive medication appropriate to their medical needs, in doses meeting their own individual requirements, for an adequate period of time and at the lowest cost to them and to the community". (*Wettermark et al* 2010; *Godman et al* 2012)

Context

Improving a health system requires simultaneous pursuit of three different aims:

- improving the population health

- improving the experience of care

- reducing per capita costs of health care.

Berwick et al 2008

Structure, process and outcome

Quality indicators can refer to structures, processes (inter-personal or clinical), or outcomes of care,

General examples of indicators	
Structure indicators	Number of professionals (full time equivalents) per 1000 patients Presence of multidisciplinary deliberation for cancer patients
Process indicators	Diagnosis management Referral management Prescription management Vaccination rates
Outcome indicators	Hospital re-admission rates Post-operative wound infections rates Patient experience Patient reported outcome measures (PROMs)

Dimensions in prescribing quality indicators

- Perspective - patient, prescriber, budget-holder

- Structure - process, outcome

- Context – drug/drug class, disease, patients

Dimensions: drug utilisation studies

Defining and developing quality indicators for drug utilisation Campbell et al 2016
Drug Utilization: Methods and application p126-138

STRUCTURES (1)

Physical characteristics

Workforce characteristics

Dimension	Examples or areas where quality indicators could be developed
Resources	Financial, personnel, buildings, equipment, availability of information e.g. a drug formulary or interaction database, clinical data and registries
Organisation of resources	Provider continuity, hours of operation, organization of prescribing and supply of medicines
Management	Administration, operational and strategic management to support rational drug prescribing (e.g. Drug and Therapeutics Committees)
Skill-mix	Skills/knowledge of staff
Team work	Team functioning; delegation, role in promoting quality of medicines use

Dimensions: drug utilisation studies

(Defining and developing quality indicators for drug utilisation Campbell et al 2015)

STRUCTURES (2)

Systems characteristics

Dimension	Examples or areas where quality indicators could be developed
Engineering activities	Organizational or managerial interventions such as prescribing targets, price–volume agreements
Educational activities	Extent and nature of prescribing guidance. These may range from simple distribution of printed material to more intensive strategies such as educational outreach visits by trained facilitators.
Economic interventions	Insurance and reimbursement systems, patient co-payment including tier levels, positive and negative financial incentives and budgets for physicians
Enforcement	Regulations by law such as generic substitution at pharmacies or prescribing restrictions for physicians

Dimensions: drug utilisation studies

(Defining and developing quality indicators for drug utilisation Campbell et al 2015)

PROCESSES

Clinical care

-acute

-chronic

-preventive

Inter-personal aspects of care

Dimension	Examples or areas where quality indicators could be developed
	History taking including medication history, relevant measures taken (e.g. lab test) when initiating drug treatment, appropriate drug prescribing, appropriate ongoing monitoring, medicines reconciliation
	Communication with patients: information exchange and motivational interviewing, patient adherence and persistence

Dimensions: drug utilisation studies

(Defining and developing quality indicators for drug utilisation Campbell et al 2015)

OUTCOMES

Health status

User evaluation

Systems

Dimension	Examples or areas where quality indicators could be developed
Freedom from disease, comfort, longevity	Functional status, symptom relief, quality-adjusted life years. May include both positive effects of the drug therapy and negative consequences such as hospitalizations, adverse events and reduced quality of life.
HRQOL	Satisfaction, communication, self-esteem
Efficiency, efficacy and equity	May include patient outcome at a population level but also outcome of interventions to promote rational use of drugs

HRQOL - health-related quality of life

Attributes

Clear: clearly defined aspect of quality of care

Valid: measures what was intended

Acceptable: to those being assessed and the assessors

Consequences: desired outcomes set *a priori*

Unintended consequences: minimised and implementation issues known

Attributable: achievement of the aspect of care defined by an indicator should be 100% under the control of those being assessed

Evidence base: underpinned by guidelines or other relevant evidence (e.g. safety warnings)

Campbell et al 2002, 2015

Feasible: valid and reliable consistent data are available and collectable

Reliable: minimal measurement error, reproducible findings

Sensitive to change: has the capacity to change with changes in prescribing behaviours and detect changes in quality of care, to discriminate between and within subject

Predictive value: has the capacity to predict quality of care outcomes.

Relevance: be in an area where there's a recognized gap between actual and potential performance

New Drugs: pre-, peri- and post

- Model to optimise the managed entry of new drugs pre-, peri- and post launch

- For example, structure indicators defining and forecasting the capacity of the health system to handle the new drug should be developed <u>before</u> the new drug is available on the market; especially where there are uncertainties regarding its clinical value, and to provide pertinent information to prescribers, patients/carers.

Introduction of new medicines (2)

- Define quality and the attributes of quality to be measured
- Address how to measure each aspect of defined quality
- Decide who the customer is
- Transparent recording of conflicts of interests of all stakeholders involved
- Identify the appropriate unit of analyses (macro-meso-micro) and the availability of feasible and reliable data sources
- Data collection systems that underpin measurement before quality improvement begins ("know your baselines")
- Multiple approaches targeting quality and safety within a systems based strategy
- A mix of structure, process and outcomes indicators
- A mix of top-down and bottom-up approaches
- Validated, field/pilot-tested indicators

NB: Based on Campbell et al 2010

Why monitor prescribing?

- As a basis for **quality improvement**
- As part of **pay-for-performance** schemes
- To **monitor** perceived performance
- To **save** money / increase efficiencies
- To increase **market** share / maximise **profit**
- As part of **regulation** (e.g. of minimum standards)
- To assist **purchasing** (e.g. contract standards)
- To identify areas of need for **future investment**
- To inform service **users** or **purchasers**

Piloting indicators

Why Pilot?

- Test feasibility: e.g. IT issues, complexity and speed of change
- Test reliability: comparing like with like across different settings or times
- Test feasibility: what is the extent of improvement from baseline?
- Identify baseline prevalence levels: know where you stared from and how large is the issue
- Find out what people think of them – do they resonate?

Criteria for retiring indicators

Criterion

Reported achievement

    Average rate   High

    Variation   Low

    Historical trends   Plateauing

Exception – balancing measures

Reeves et al. BMJ 2010

Quality Prescribing Indicators

Create and build prescribing indicators/measures that have value to front-line clinicians

Make good use of the data that is available

Make the indicators/measures accessible to those that want to use them

THANK YOU

Developing
Quality Prescribing Indicators
Scotland's experience

Seán MacBride-Stewart

Overview

- Data sources

- Process

- Key considerations
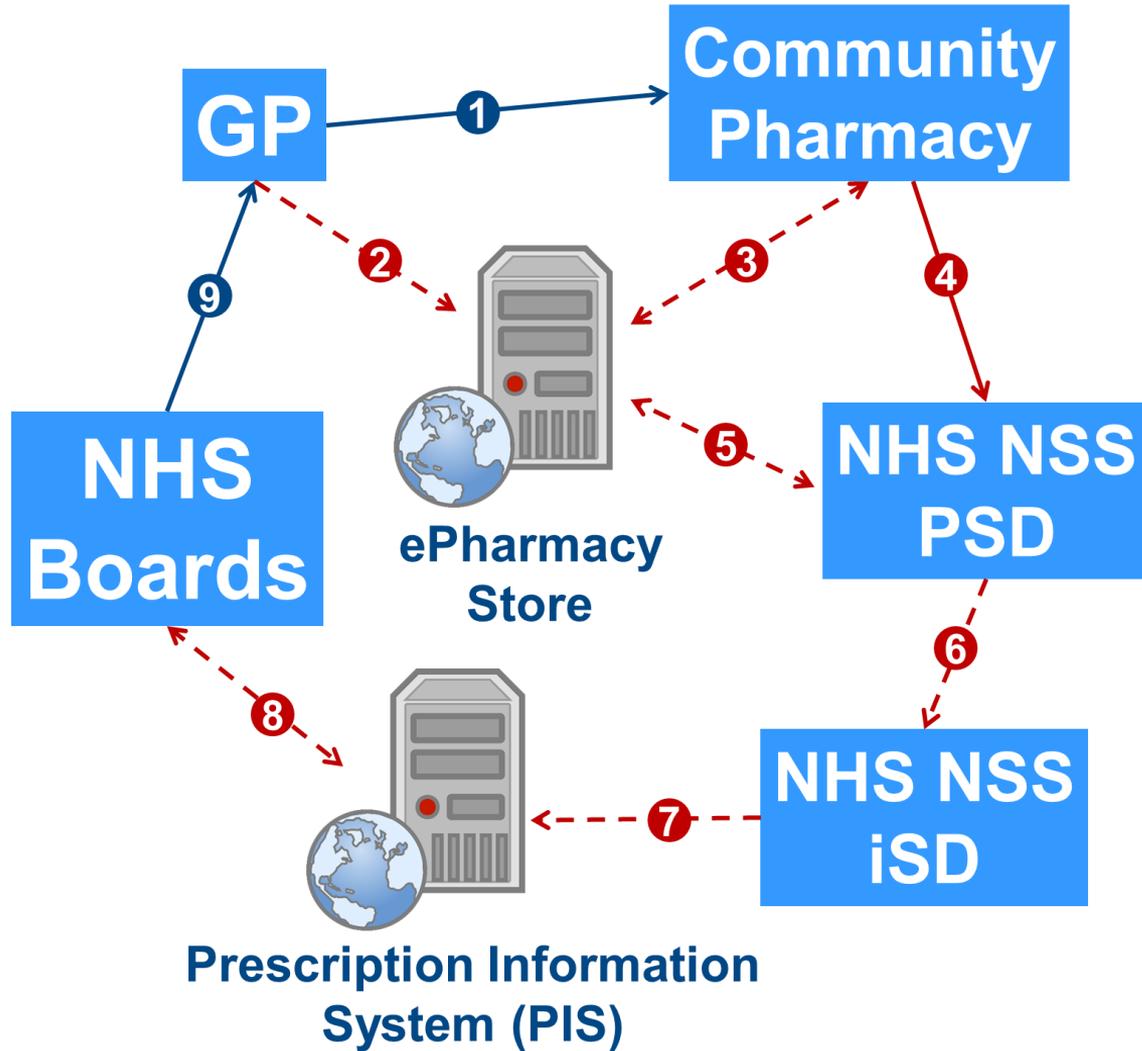
1. Rx form generated
2. eRx created
3. eRx used by CP
4. Rx form passed to NHS
5. eRx used for payment
6. Data transferred
7. PIS updated
8. MUR analysis
9. MUR reports to Rxers

What is included?

- All NHS funded medicines dispensed from community pharmacies
- Including
  - All prescription only medicines
  - Many pharmacy only and general sale medicines
  - NHS funded appliances and devices
  - Specially manufactured medicines

What's missing?

- Hospital administered/dispensed medicines

- Vaccines

- Dispensing from private prescriptions (NB this is very rare)

How is it made available?

- Business Objects/Web Intelligence
- Fully reconciled
  - Monthly
  - 6-8 weeks delayed
- Digital prescriptions (ePharmacy messages)
  - Prescribed - 2 days delayed
  - Dispensed - end of monthly

PRISMS (aggregate data)	Prescription Information System (patient-level data)
All NHS prescriptions	All NHS prescriptions
Aggregated to months	Item level
Prescriber identifiers	Prescriber identifiers
	Patient identifiers (CHI)
Drug name, quantity, cost	Drug name, quantity, cost
	Dose Instructions (ePharmacy)
DDDs	
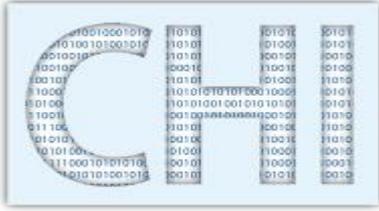
Patient level data allows
- Longitudinal analysis of prescribing to individuals over time
- Population analysis of prescribing at any point in time
- Or both
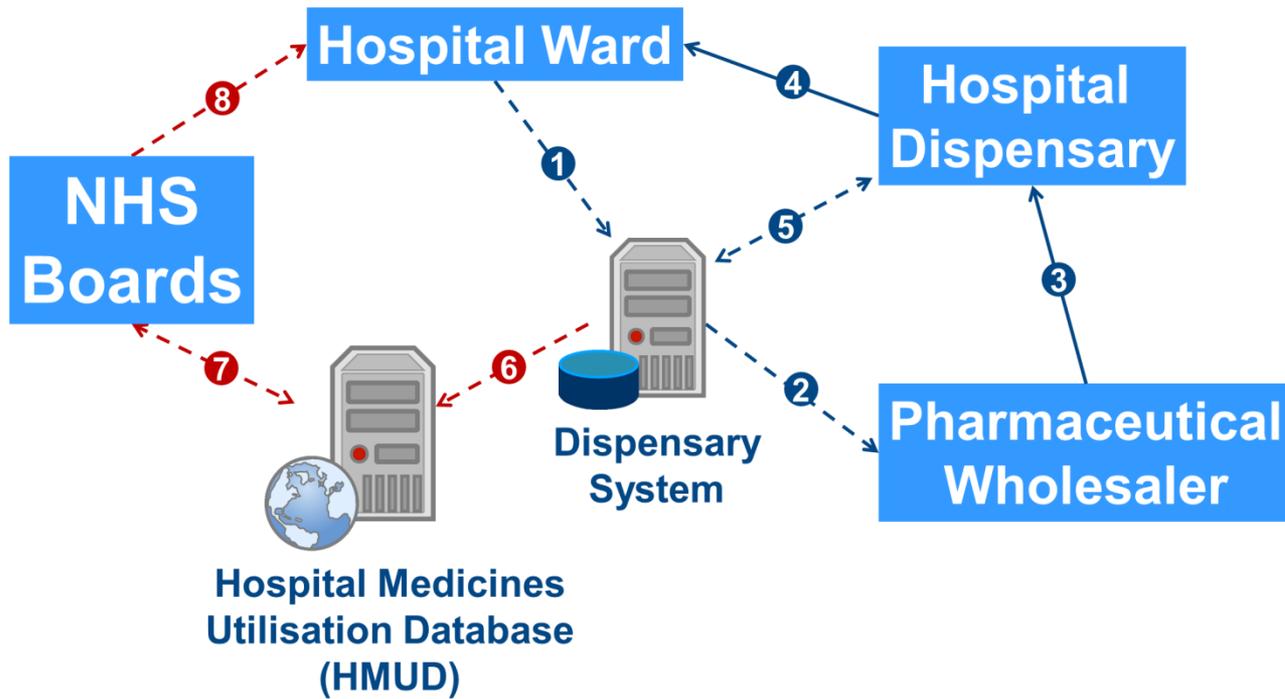
1. Ward stock requested
2. Stock ordered
3. Supplied to dispensary
4. Supplied to ward
5. Stock levels updated
6. MU summary extract transferred to HMUD
7. MUR Analysis
8. MUR reports to ward/dispensary

Monthly update of medicines brought into dispensaries and transferred across hospital wards

Missing data: prescriber, patient, dose administered/taken, patients own medicines

Translating Analysis into Indicators

Analysis is used to:

1. Investigate an issue
2. Confirm the issue can be identify from the prescription data
3. Provide comparison to identify variation

Indicators are developed when:

- deemed worthy of use as an indicator and of wider reporting

- to support improvement initiative

Types of Indicator

- Process indicators
  - Wider perspective
  - Influenced by many processes
  - Do not require patient-level data

  For example the overall rate of prescribing antibiotics expressed as DDDs per 1,000 of the population (or per 1,000 residents registered to their local GP practice)

Types of indicator (2)

- Quality indicators
  - Focus on a specific outcome
  - Influenced by a small(er) number of processes
  - Sensitive to changes in these specific processes
  - Patient-level

  For example the prescribing of combinations of medicines that increase the risk of acute kidney injury

Original Process for NTI Development

2012
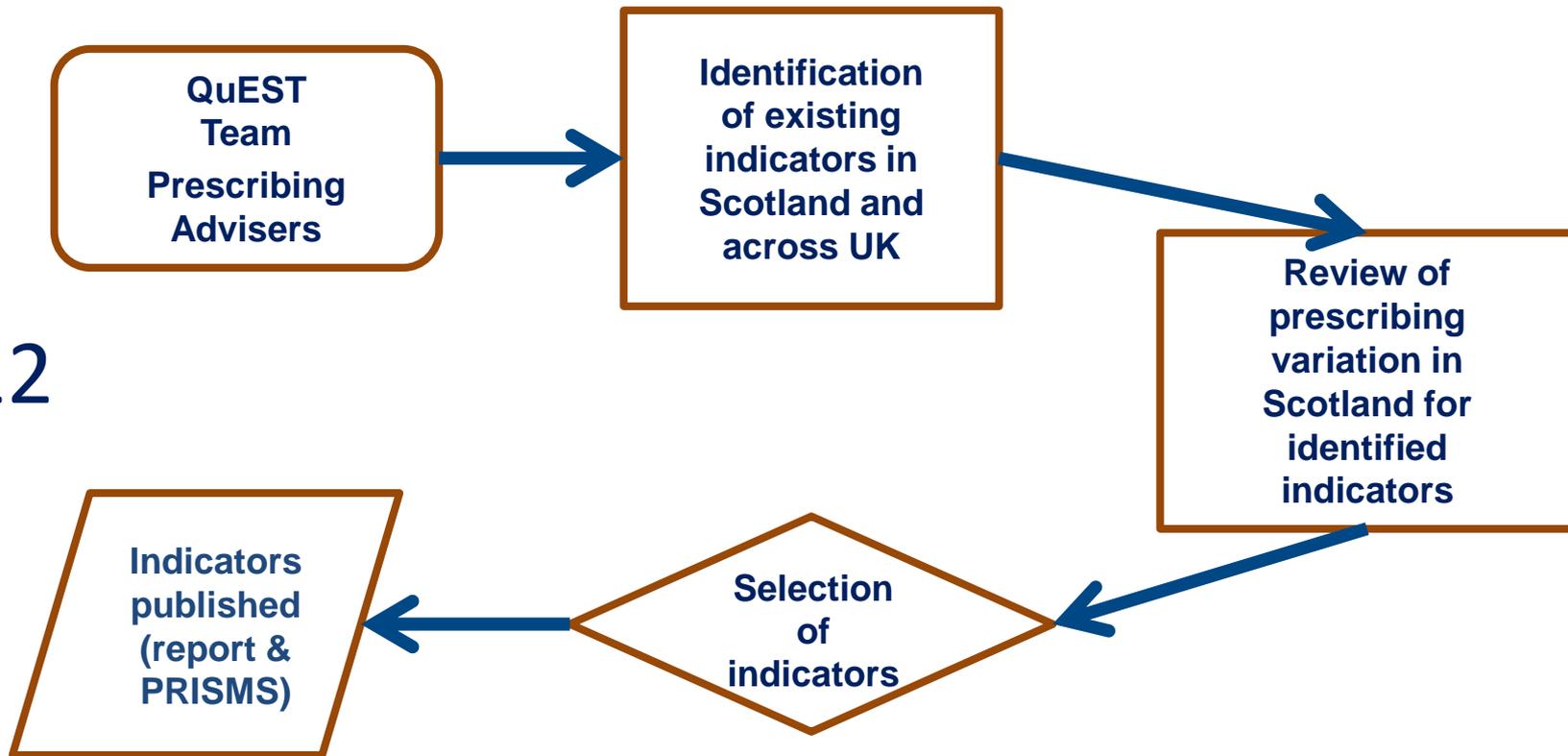
Key Considerations

- Variation between GP practices in addition to overall prescribing levels

- Choice of therapy (e.g. DDDs of simvastatin, atorvastatin & pravastatin as a percentage of DDDs for all statins)

- Overall propensity to prescribed (e.g. DDDs of hypnotics and anxiolytics per 1,000 patients per day)

Key Considerations (cont)

- Considered use of measures (e.g. number of prescriptions for antibiotic per 1,000 registered population per day rather than DDDs)

- Some new (and challenging) indicators (e.g. DDDs of established oral hypoglycaemics (metformin & sulfonylureas) as percentage of all antidiabetic drugs)

Metformin and sulphonylureas as a % of all Antidiabetic drugs DDDs (PRISMS data used: June 2011 to August 2011)
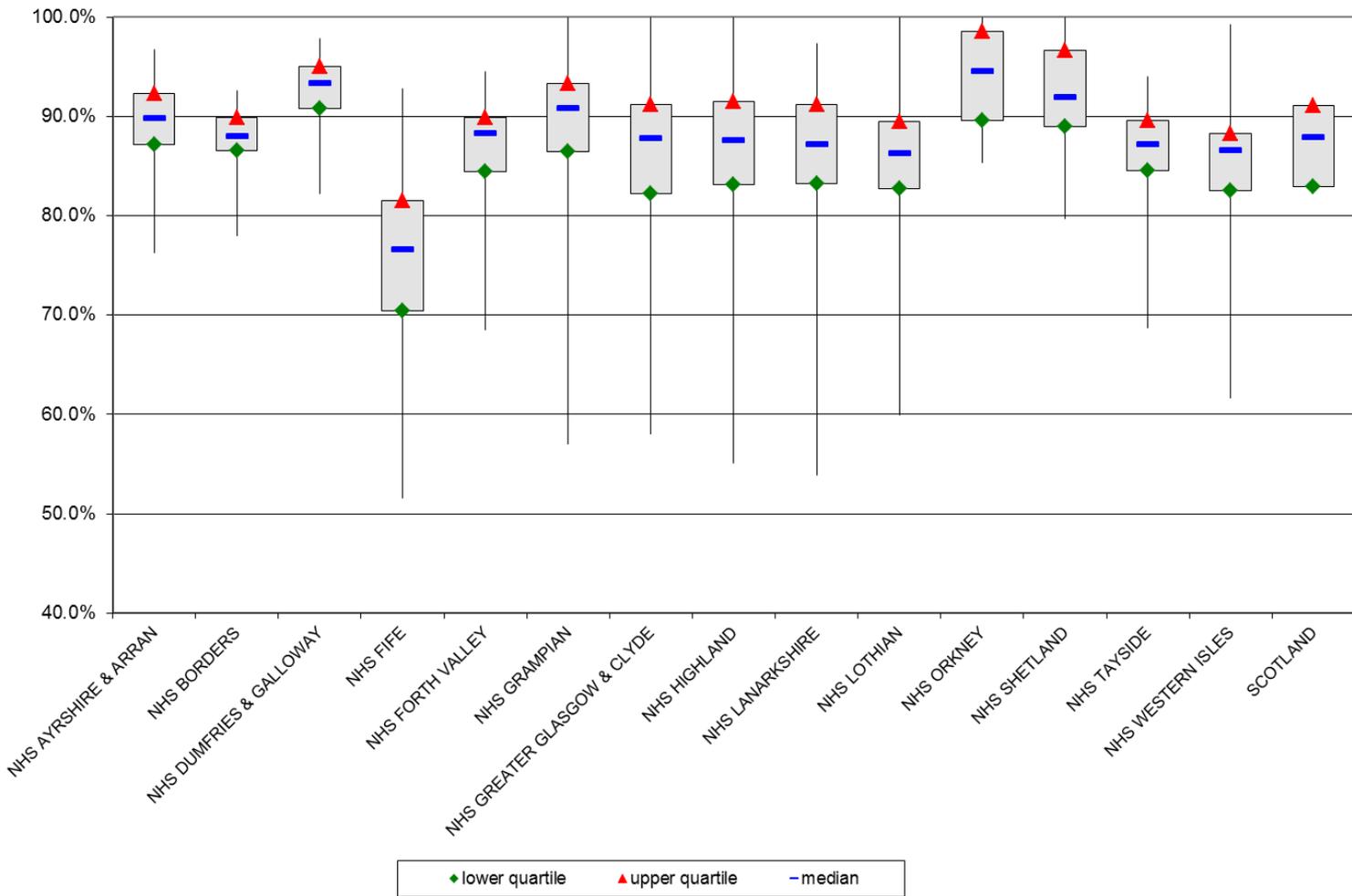
Current Process for NTI Development
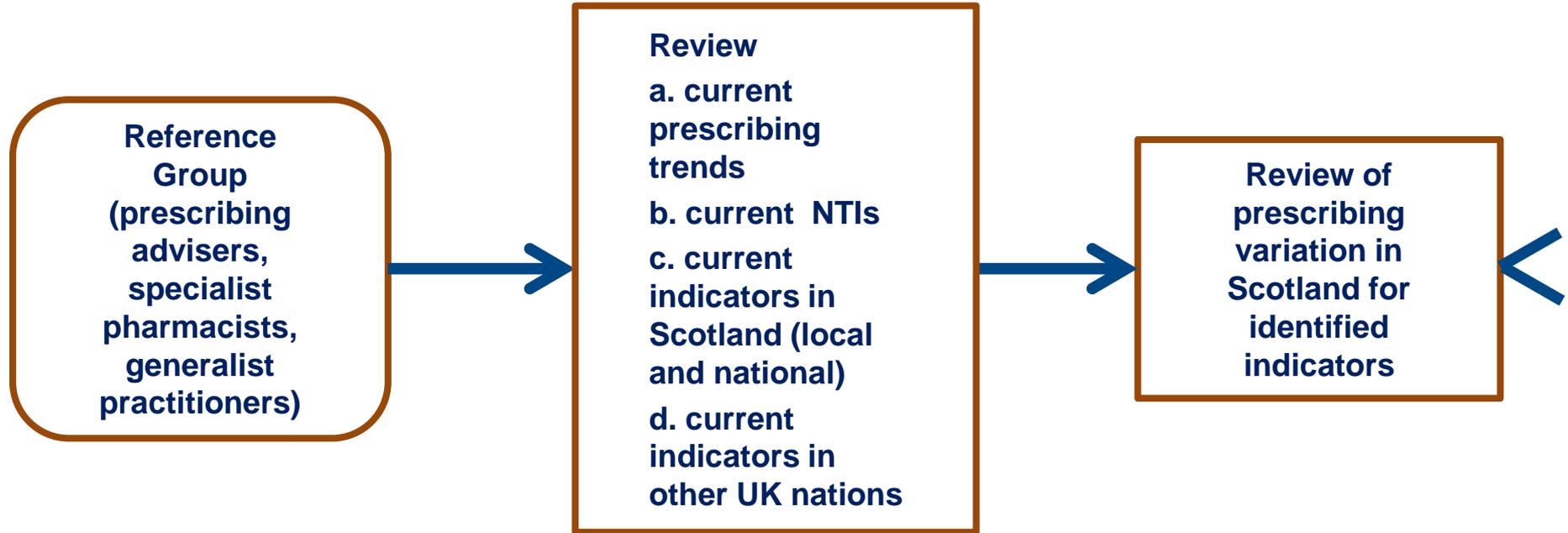
Current Process for NTI Development
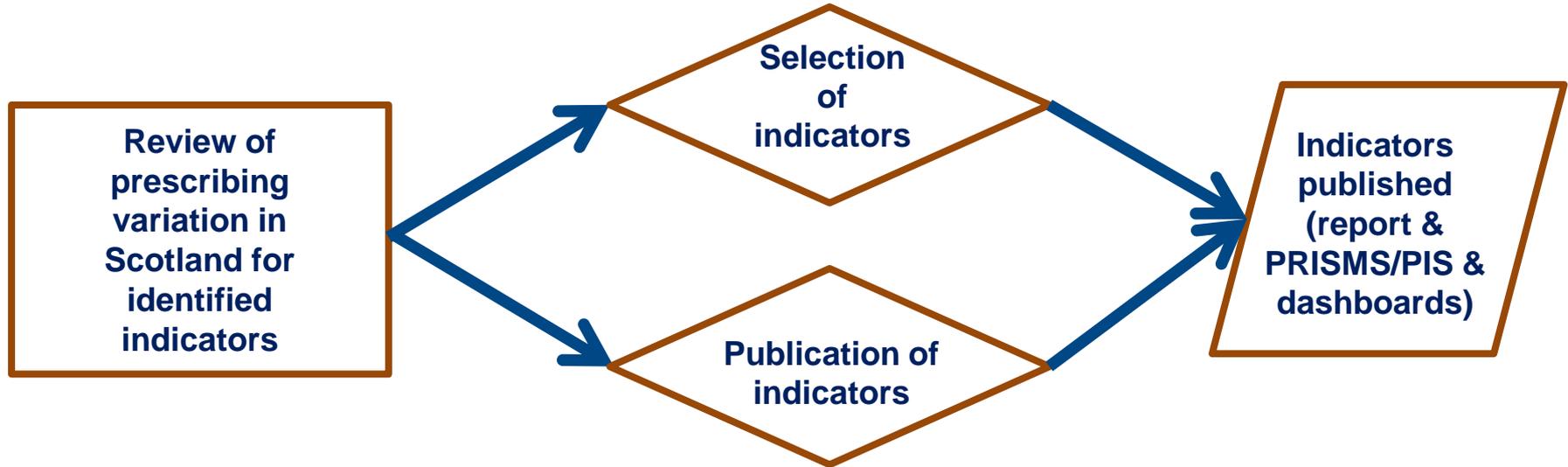
Main Changes from 2014

- Looking back at past trends as well as at current prescribing (e.g. changes in variation between GP practices)

- Reference group with wide membership including prescribers, prescribing advisers and other interested agencies (e.g. patient safety officers)

Main Changes from 2014 (cont)

- Other nations in the UK with access to their patient-level prescription data

- Increasing widespread use of drug orientated indicator using patient-level data

- Disease orientated indicator using patient-level data is slower due to difficulty linking to diagnosis (different dataset)

Sulfonylureas: number of people aged ≥75 years prescribed sulfonylureas as a percentage of all people aged ≥75 years prescribed an anti-diabetic drug

Sulfonylureas: number of people aged ≥75 years prescribed sulfonylureas as a percentage of all people aged ≥75 years prescribed an anti-diabetic drug

Percentage of patients

○ October to December 2015　● October to December 2016　● October to December 2017
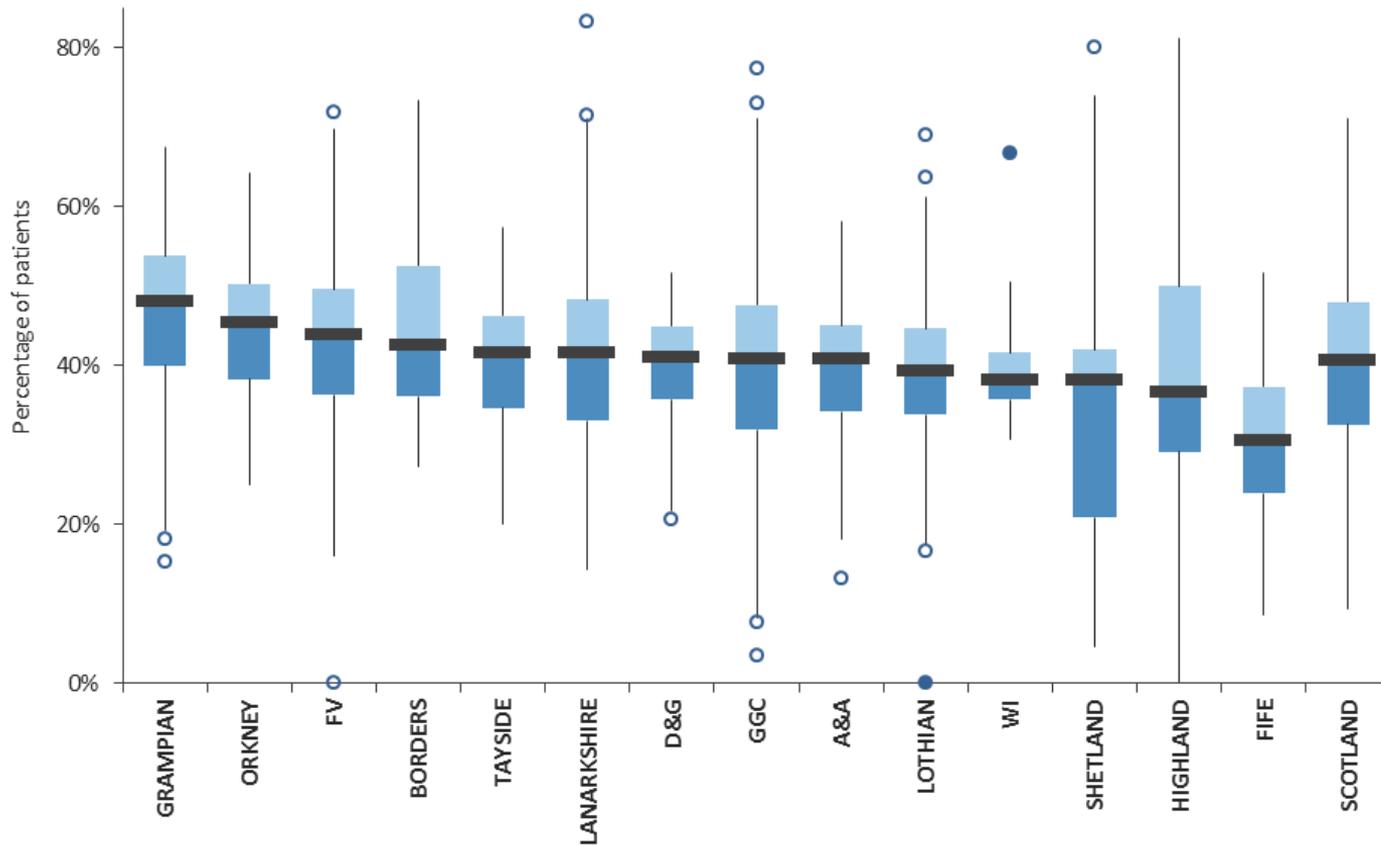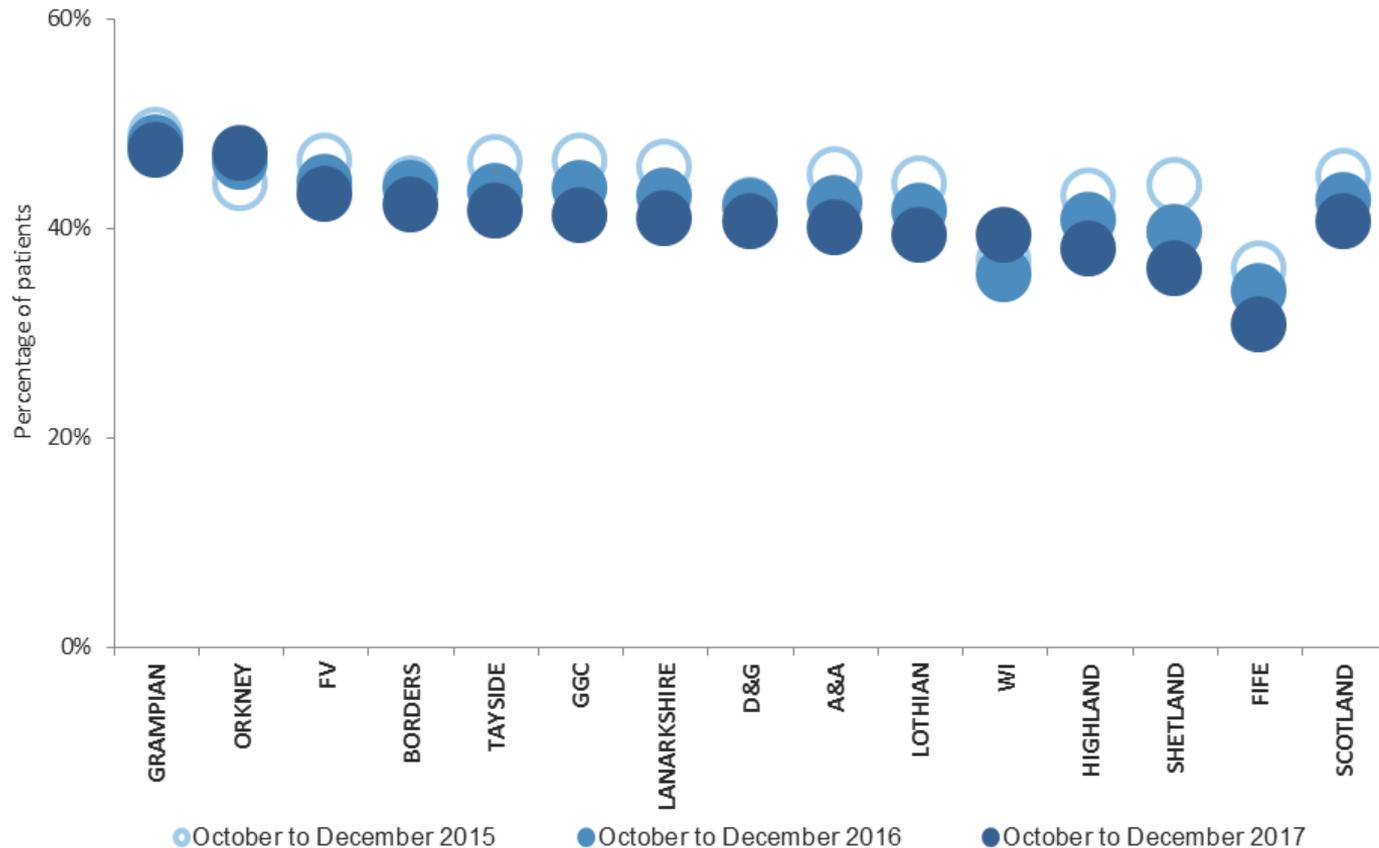
Future Developments

- Visualisation and feedback methods
  - dashboards, eReports
  - interactive and intuitive

- Analysis
  - increasingly thoughtful use of existing data
  - data linking (e.g. diagnosis, outcomes) and blending
  - better denominators

Quality Prescribing Indicators Scotland's Goal

Create and build prescribing indicators/measures that have value to front-line clinicians

Make good use of the data that is available

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Acknowledgements – NTI Reference Groups, NHS National Services Scotland (Paul Paxton),
PhD Supervisors (Prof Bruce Guthrie, Dr Charis Marwick) **Declaration of interests -** none

Overview

- Development of National Therapeutic Indicators (NTIs)

- Examples

- Weaknesses & strengths

www.therapeutics.scot.nhs.uk
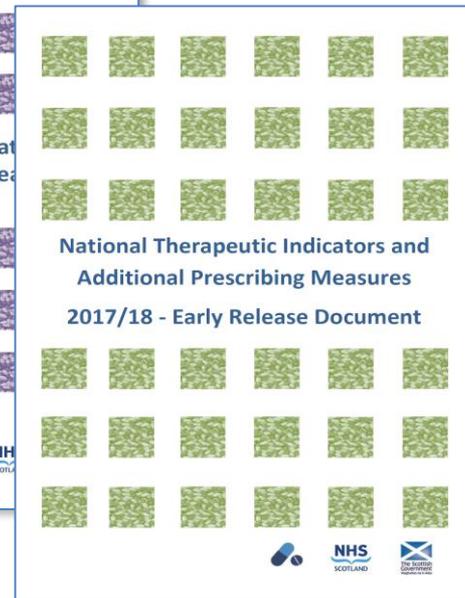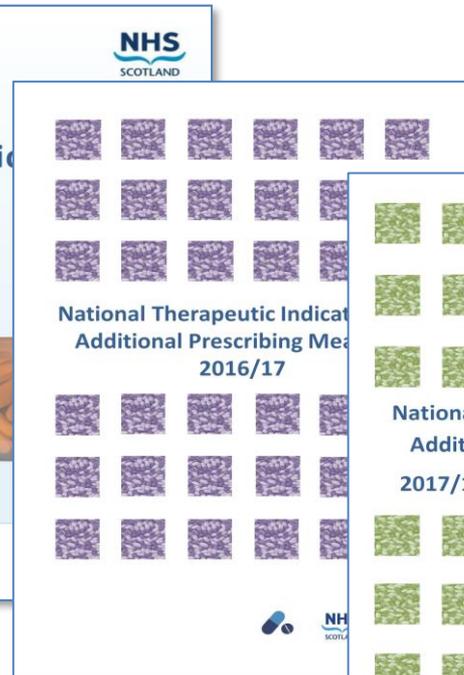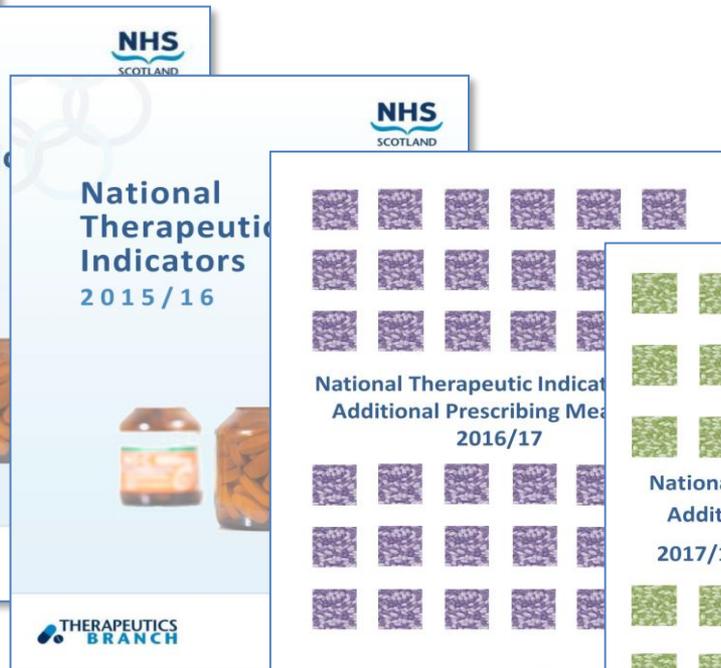
Current NTIs
Types of measurement

PRISMS (aggregate data)
- Volume
- Choice
- Cost

PIS (patient-level data)
- Potentially harmful combinations of medicines
- Potentially harmful excess doses
- Potentially harmful long-term use
- Potentially harmful use in older age
- Potentially harmful omission of treatments

Current NTIs
Range of Therapeutic Topics

Indicator Group	Drug Group / Adverse Effect
CNS - analgesic	Analgesics (gabapentanoids)
CNS - analgesic	Analgesics (opioids)
CNS - analgesic	Topical Anaesthetic
CNS - psychotropic	Hypnotics and Anxiolytics
Endocrine	Antidiabetic drugs
Endocrine	SMBG
Gastrointestinal	Proton Pump Inhibitors
Infection	Antibiotics
Infection	Antibiotics (4C)
MHRA warning	Developmental disability or birth defects
Musculoskeletal	NSAIDs
Respiratory	Inhaled Corticosteroids
Respiratory	Mucolytics
Wounds	Antimicrobial Wound Products

Indicator Group	Drug Group / Adverse Effect
Polypharmacy	Acute Kidney Injury
Polypharmacy	Antibiotics (repeated courses)
Polypharmacy	Antibiotics (UTI)
Polypharmacy	Anti-diabetic Drugs
Polypharmacy	Antipsychotics
Polypharmacy	Bone Marrow Suppression
Polypharmacy	Falls, Fractures and Delirium (x 3)
Polypharmacy	High Strength Inhaled Corticosteroids
Polypharmacy	Opioid and gabapentinoid dependency (x 3)
Polypharmacy	Poor Asthma Control

NTIs

NTIs often bundled - for example

    1. Opioid NTI measures overall volume of prescribing

       - *number of DDDs per 1,000 GP practice list size*

    2. Complimentary Polypharmacy NTIs identify patients with specific prescribing patterns who might be a greatest risk of dependence/addiction and benefit most from a review

       - *prescribing of strong opioids for > 2 years*

       - *prescribing of opioids for > 6 months at a cumulative dose of > 120mg morphine equivalent per day*

Example 1

12 NTIs – April 2012

2 NTIs - shift to target by April 2013

Home > Drug Safety Update

Quinine: not to be used routinely for nocturnal leg cramps

From: Medicines and Healthcare products Regulatory Agency
Published: 1 June 2010
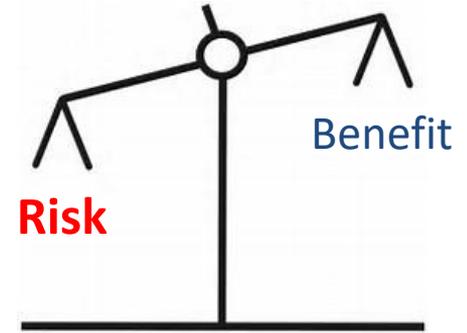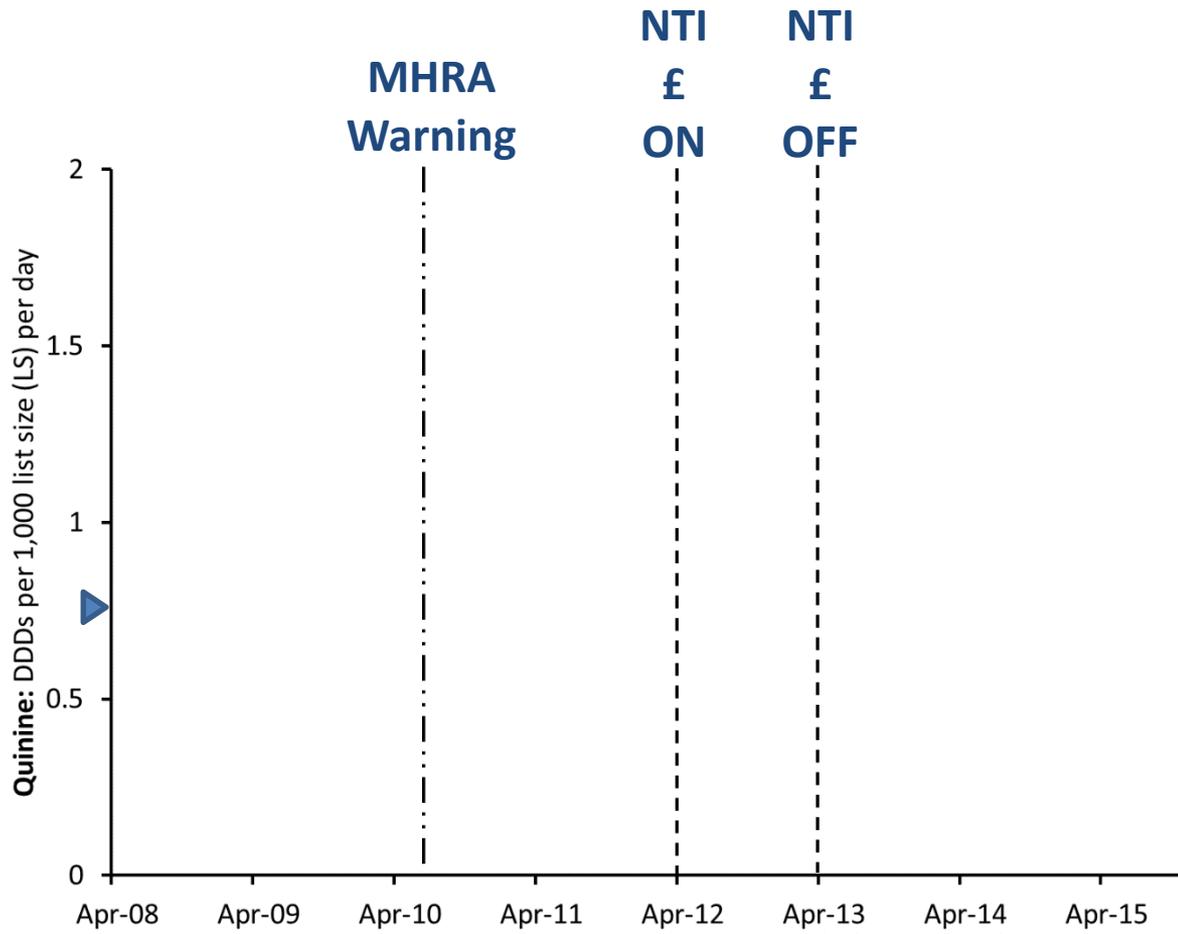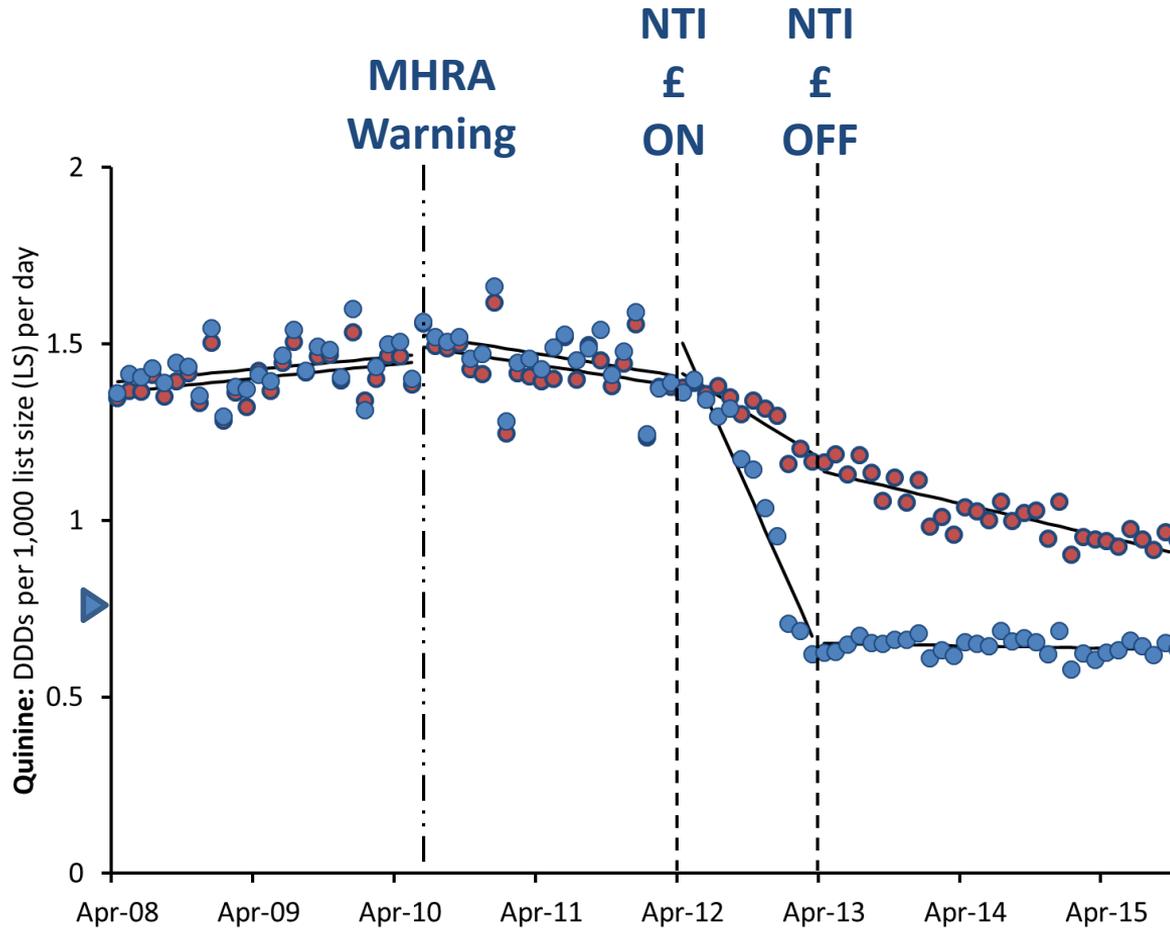
Risk

Benefit

Quinine Sulphate 300mg
Coated Tablets
For oral use
28 Tablets

62

1:1 Matched Pairs

n=241 practice pairs

MHRA Warning

NTI £ ON

NTI £ OFF

Quinine: DDDs per 1,000 list size (LS) per day

2

1.5

1

0.5

0

Apr-08   Apr-09   Apr-10   Apr-11   Apr-12   Apr-13   Apr-14   Apr-15

1:1 Matched Pairs

n=241 practice pairs

MHRA Warning

NTI £ ON

NTI £ OFF

NTI | 12m **-11.1%**

NTI £ | 12m **-55.7%**

Quinine: DDDs per 1,000 list size (LS) per day
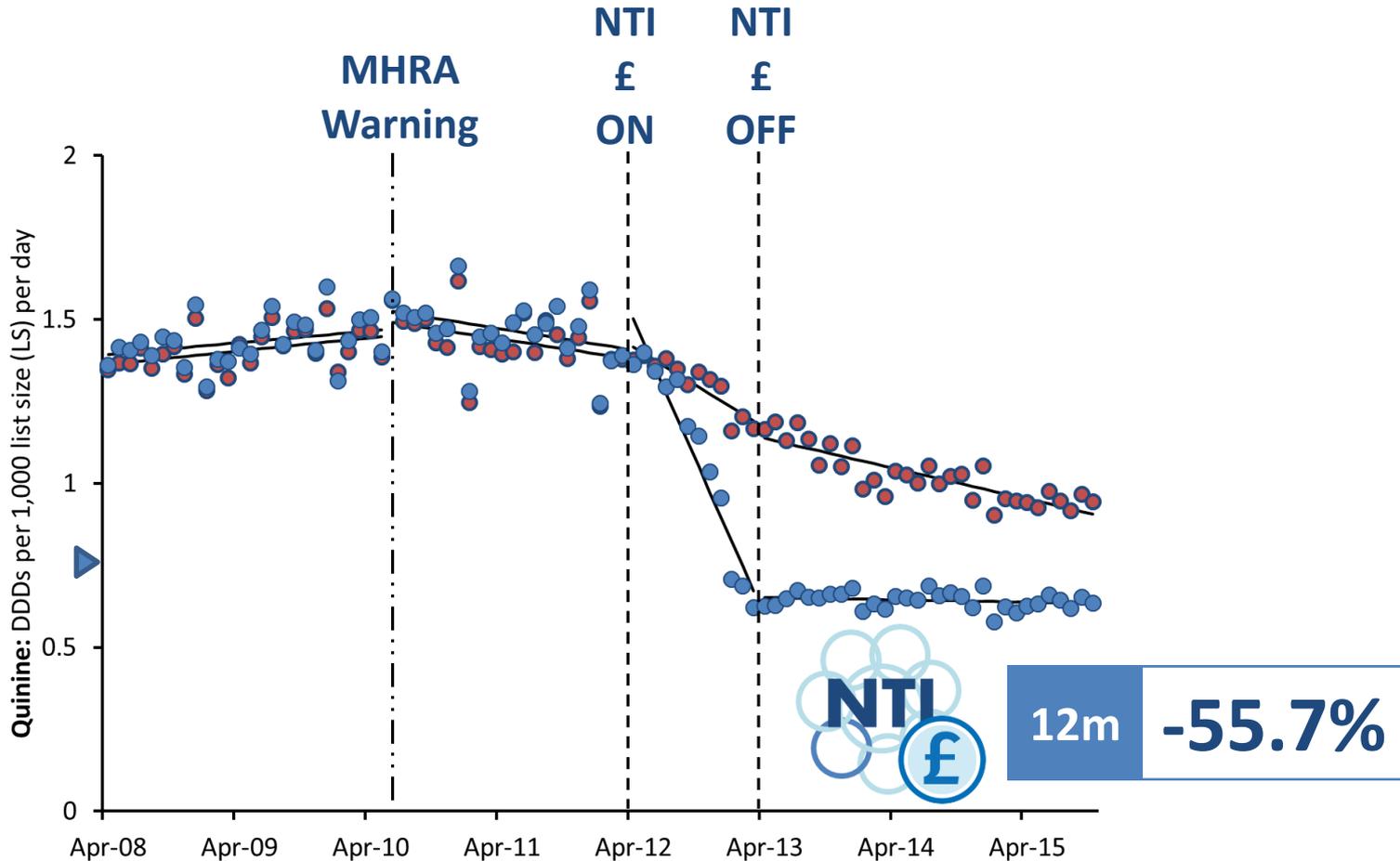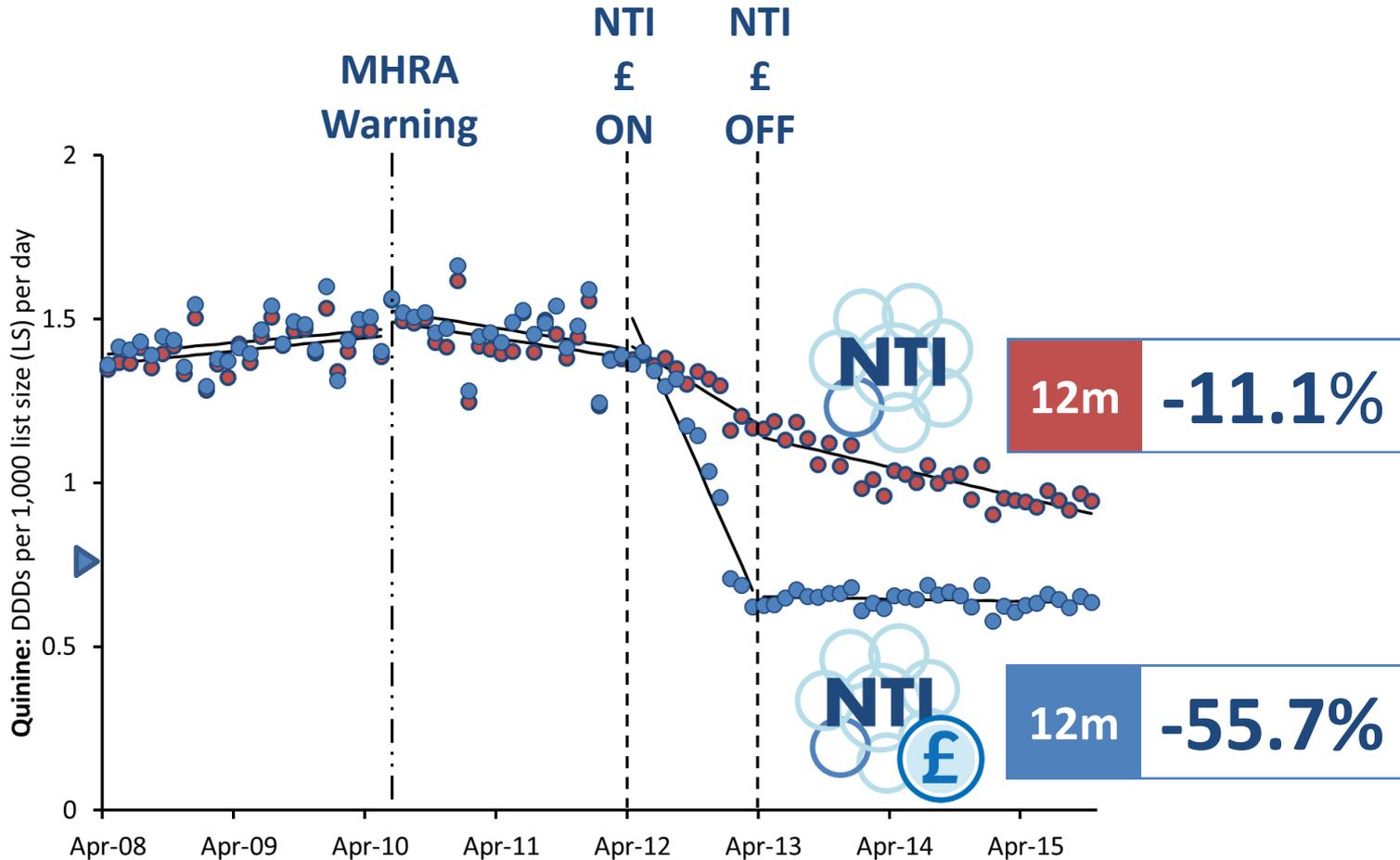
Example 2

Each year in primary care

101 million
prescription items
are issued in primary care

61,000 non-elective hospital admissions are due to medicines
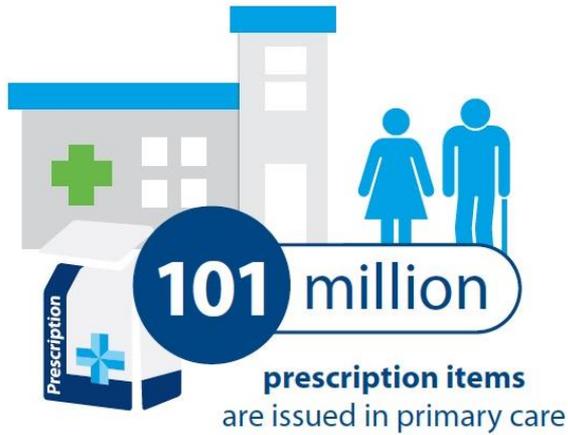
5 classes of medicines
account for most admissions

NSAIDS
Antiplatelets
Anticoagulants
Diuretics
Anti-hypertensives

Evaluation of a complex intervention to improve primary care prescribing

- One NHS Board (n=56 practices)
- Quality improvement study (2 cycles)

Cycle 1 - April 2013 to March 2014
Acute Kidney Injury
- NSAID taken with ACEI/ARA plus diuretic (≥65 years)

Gastrointestinal Bleeding
- NSAID taken by older people (≥65 years)
- NSAID taken with oral anticoagulant

Cycle 2 - April 2014 to March 2015
Mortality
- Antipsychotics taken by older people (≥75 years)
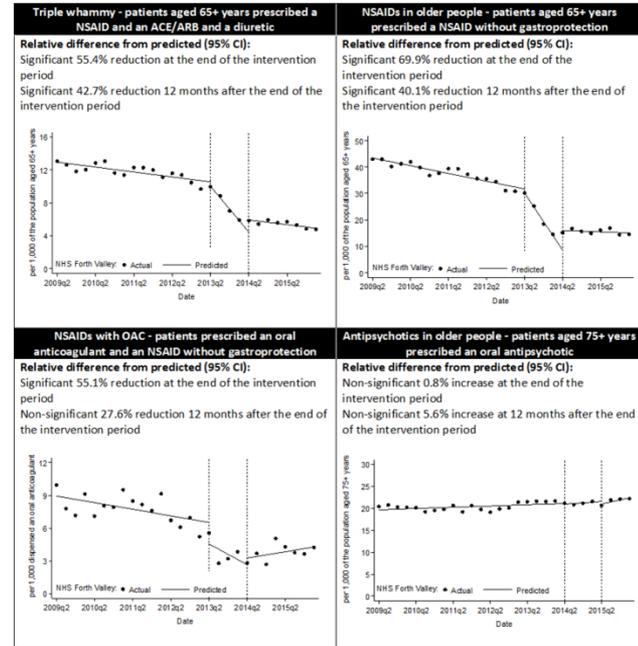
MacBride-Stewart S, Marwick C, Houston C, Watt I, Patton A, Guthrie B. Evaluation of a complex intervention to improve primary care prescribing: a phase IV segmented regression interrupted time series analysis. Br J Gen Pract 2017. https://doi.org/10.3399/bjgp17X690437

| Triple whammy - patients aged 65+ years prescribed a NSAID and an ACE/ARB and a diuretic	NSAIDs in older people - patients aged 65+ years prescribed a NSAID without gastroprotection
Relative difference from predicted (95% CI): Significant 55.4% reduction at the end of the intervention period Significant 42.7% reduction 12 months after the end of the intervention period	**Relative difference from predicted (95% CI):** Significant 69.9% reduction at the end of the intervention period Significant 40.1% reduction 12 months after the end of the intervention period
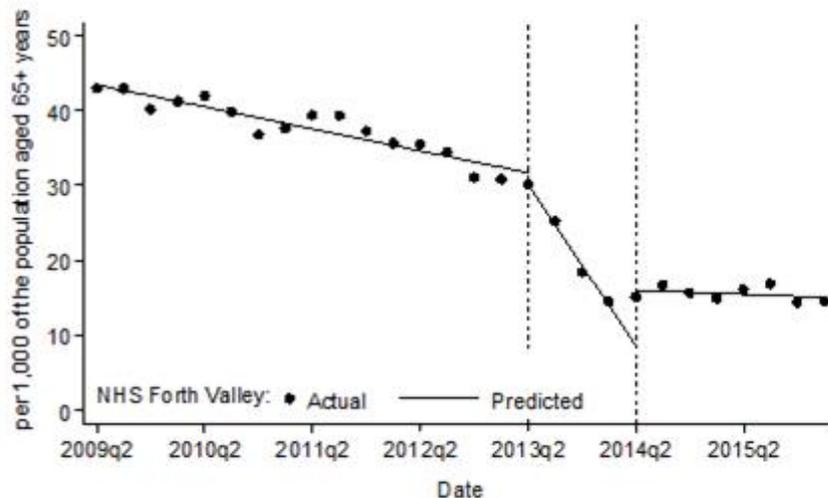
| NSAIDs with OAC - patients prescribed an oral anticoagulant and an NSAID without gastroprotection	Antipsychotics in older people - patients aged 75+ years prescribed an oral antipsychotic
Relative difference from predicted (95% CI): Significant 55.1% reduction at the end of the intervention period Non-significant 27.6% reduction 12 months after the end of the intervention period	**Relative difference from predicted (95% CI):** Non-significant 0.8% increase at the end of the intervention period Non-significant 5.6% increase at 12 months after the end of the intervention period
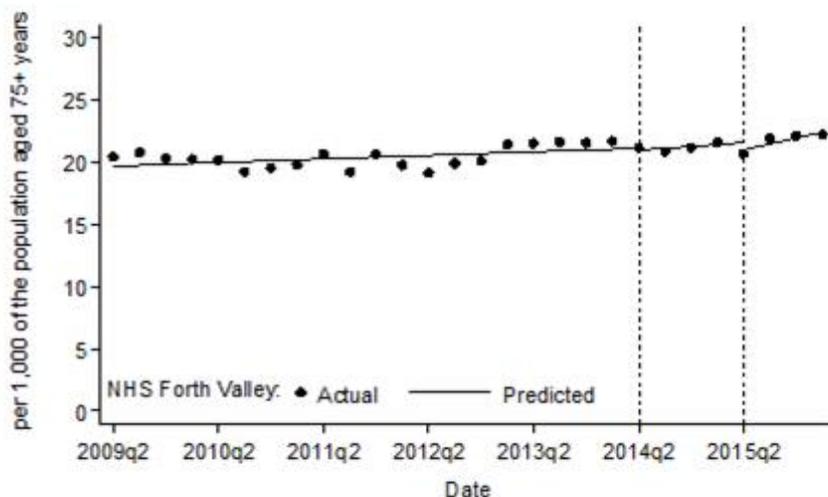
NSAID prescribing to patients aged ≥65 years prescribed an ACE inhibitor/angiotensin receptor blocker and a diuretic (EFIPPS) as a percentage of all people aged ≥65 years "Triple Whammy"
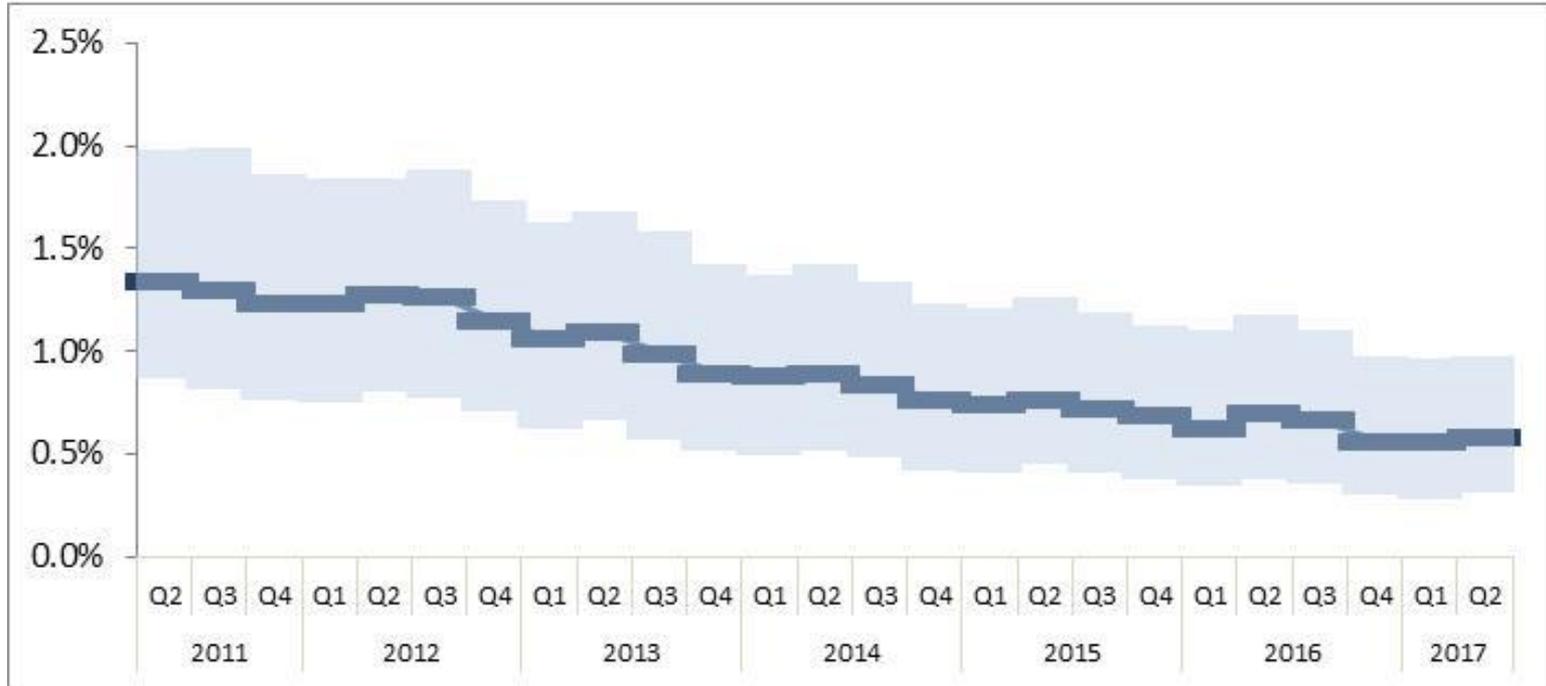
All GP Practices in Scotland — Median — Interquartile Range (middle 50%)

NSAID prescribing to patients aged ≥65 years prescribed an antiplatelet without gastroprotection (EFIPPS) as a percentage of all people aged ≥65 years
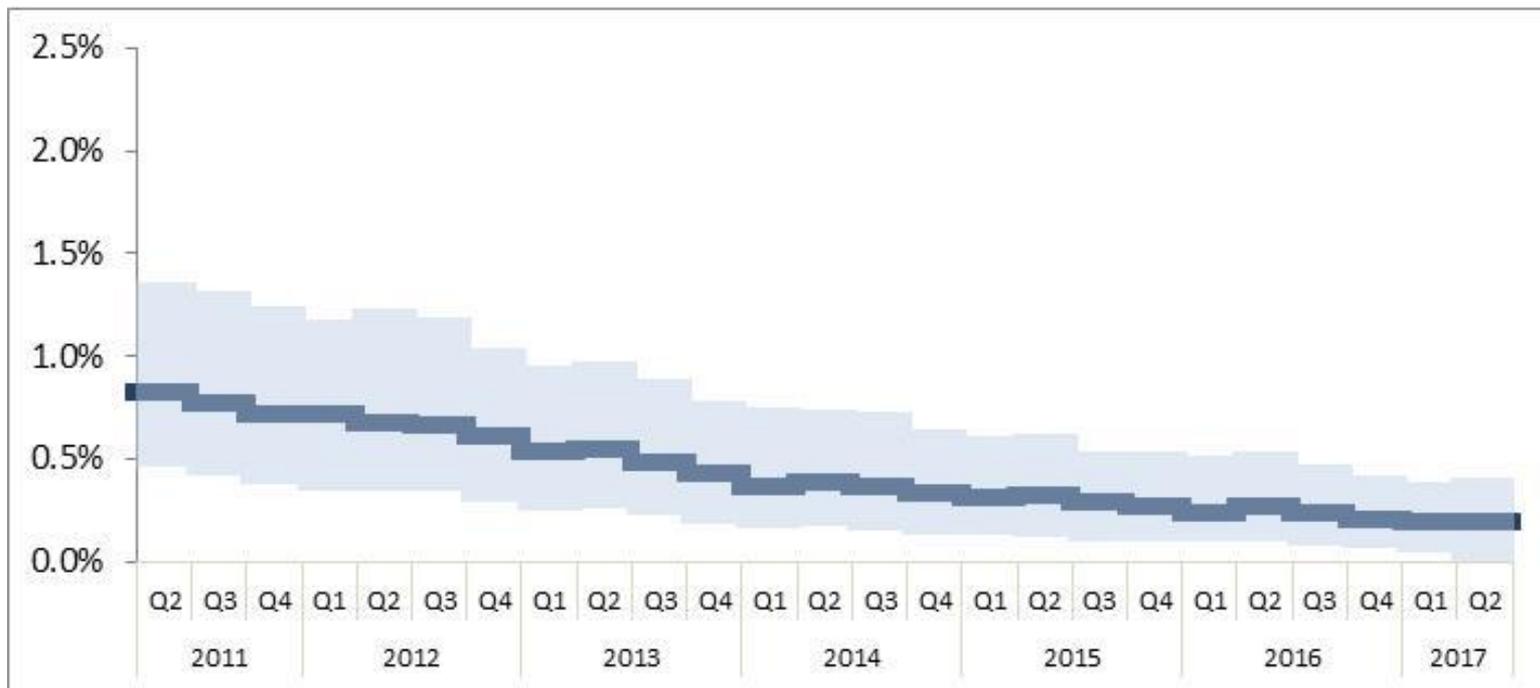
All GP Practices in Scotland — Median — Interquartile Range (middle 50%)

NSAIDs including Cox-2 inhibitors
Defined Daily Doses (DDDs) per 1,000 List Size (LS) per day

All GP Practices in Scotland   Median   Interquartile Range (middle 50%)

Proton Pump Inhibitors
Defined Daily Doses (DDDs) per 1,000 List Size (LS) per day
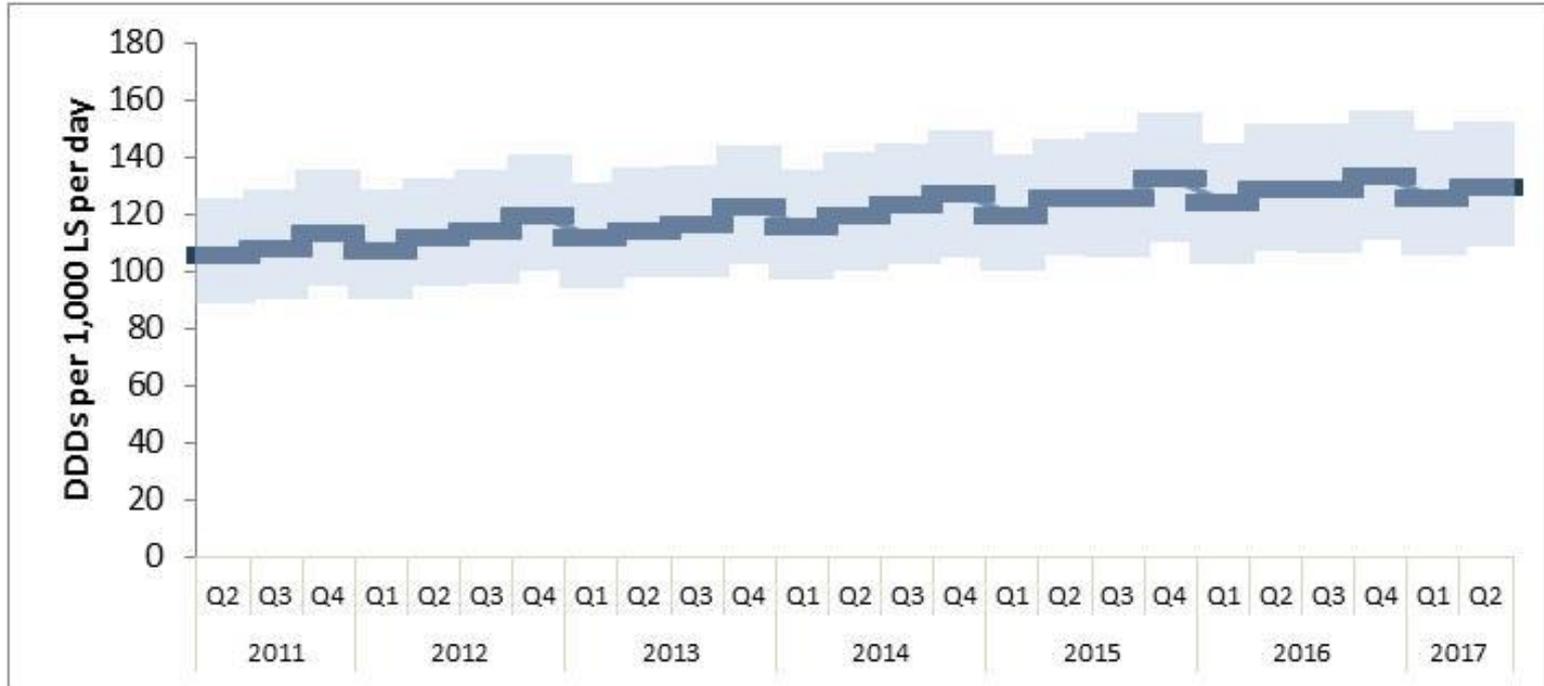
Critical assessment of the utilisation of NTIs

Strengths

- national
- administrative data
- accessible to NHS Boards, particularly prescribing advisers
- provided as a tool and not mandated
- included within other national tools (e.g. Scottish Therapeutics Utility)

Challenges

- no financial incentive scheme to support their use
- limited availability through other national channels (e.g. Primary Care Indicators (PCIs) or Discovery)
- limited understanding of their utilisation within NHS Boards

Quality Prescribing Indicators
Scotland's Goal

Create and build prescribing indicators/measures that have value to front-line clinicians

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