DENTAL PUBLIC HEALTH IN ACTION: ASSESSING THE FEASIBILITY OF USING ROUTINELY COLLECTED DATA TO PRODUCE ANTIBIOTIC PRESCRIBING PROFILES FOR GENERAL DENTAL PRACTITIONERS IN WALES

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INTRODUCTION

Dental prescribing accounts for approximately 9% of all primary care antibiotic use in Wales, and there is evidence that dentists are prescribing antibiotics when they are likely to be of little clinical benefit [1,2].

Providing practitioners with feedback on their antimicrobial prescribing has been shown to improve antibiotic prescribing in both medical and dental settings [3,4,5].

It is thought that routinely collected data on antibiotic prescribing by dentists in Wales could be used to provide personalised feedback to practitioners on their use of antibiotics in clinical practice.

AIMS & OBJECTIVES

The aim of the study was to assess the feasibility of using routinely collected antibiotic prescribing and dental treatment data to produce personalised prescribing profiles for dentists working in Wales.

The specific objectives were:

- To explore antibiotic prescribing by dental practitioners in Wales 2014/15.
- To investigate opportunities for data linkage between the antibiotic prescribing database and NHS General Dental Services (GDS) and Personal Dental Service (PDS) contract activity.
- To identify potential outcome measures which could be used to provide dentists with feedback on their prescribing.
- To explore the feasibility of calculating comparators based on Health Board and local deprivation status.

MATERIALS & METHODS

Data sources

1. Database of antibiotic prescriptions prescribed by dentists in Wales in 14/15 financial year, compiled from dispensing data.
2. Welsh NHS GDS and PDS activity for the 14/15 financial year.
3. Welsh Index of Multiple Deprivation (WIMD) 2014.

Data linkage

Prescribing and dental activity data were linked via NHS Dental Performer Number in Microsoft SQL Server Management System. WIMD 2014 values were assigned using practice postcode in Microsoft Access & MapInfo.

Analysis

The following outcomes were analysed:

- No. of antibiotic items dispensed per practitioner;
- No. of antibiotics items dispensed per dental practice;
- No. of antibiotics items dispensed per Health Board;
- No. of antibiotic items dispensed per WIMD 2014 quintile;
- Type of antibiotic items dispensed;
- Antibiotic items dispensed per 100 courses of NHS dental treatment per practitioner;
- Antibiotic items dispensed per 100 NHS Band 1 Urgent claims per practitioner;
- Proportion of 'second-line' antibiotic items (azithromycin, clindamycin, co-amoxiclav, and clarithromycin) of total antibiotic items; and
- Proportion of antibiotic agents not recommended for use by clinical guidelines (cefalexin, cefradine, oxytetracycline, and tetracycline) of total antibiotic items.

Practitioners who had done <100 courses of treatment during the financial year OR who worked in Community or Emergency Dental Service clinics were excluded.

Practitioners ≥90th percentile for antibiotic items dispensed per 100 courses of NHS dental treatment and per 100 NHS Band 1 Urgent claims were classified as outliers. Differences between outlying and non-outlying practitioners were analysed using the unpaired t-test and Mann Whitney U Test. The level of significance was set at 5%.

RESULTS

The initial dataset contained 194,194 antibiotic items attributable to 1,207 dentists. After data cleaning, the dataset contained 178,301 antibiotic items associated with 1,079 practitioners. In total there were 2,218,872 courses of NHS treatment linked to these performer numbers.

No. of antibiotic items dispensed per practitioner
Median number of antibiotic items dispensed per practitioner per annum was 138 (IQR 60 - 235). This ranged from 1 to 903 items (Figure 1).

Type of antibiotic items dispensed
Amoxicillin and metronidazole accounted for the majority (91.6%) of antibiotics. There were 2,233 second line agents (1.25% of total items) and 1,163 items not recommended for use by clinical guidelines (0.65% of total items).

Figure 1 – Total number of antibiotic items dispensed per practitioner 2014/15
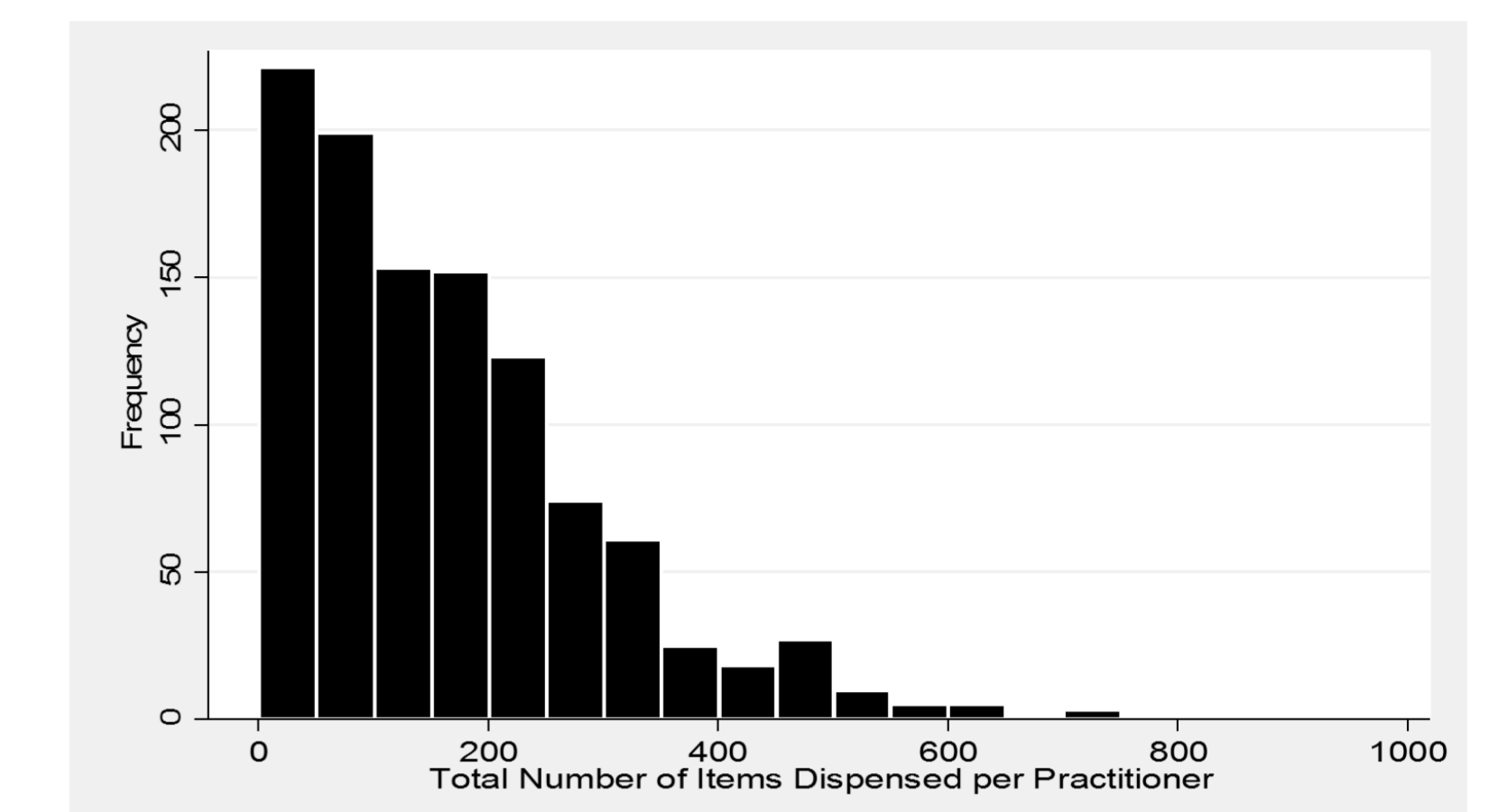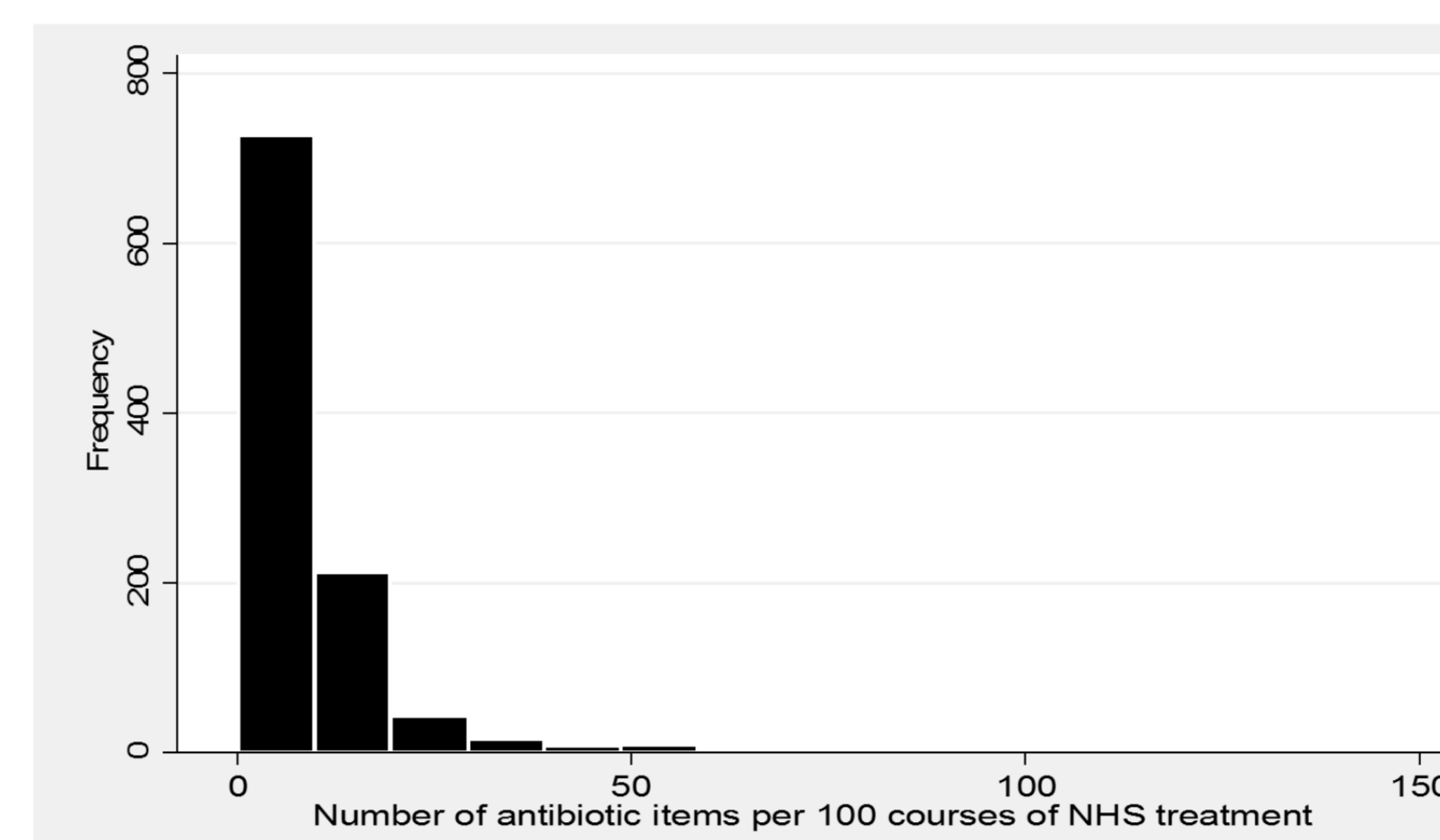

Figure 2 – Number of antibiotic items per 100 courses of NHS GDS/PDS dental treatment in Wales in 2014/15*

*censored at the 95th percentile

Antibiotic items dispensed per 100 courses of NHS dental treatment per practitioner
Figure 2 shows the distribution of antibiotic items per 100 courses of NHS dental treatment per practitioner. Median number of antibiotic items per 100 courses of NHS dental treatment was 7.0 (IQR 4.1 - 11.5). The range was 0.1 -145.8.

Dentists on or above the 90th percentile prescribed more antibiotic items (p<0.001) but completed fewer Units of Dental Activity (p<0.001) than those <90th percentile.

Antibiotic items dispensed per 100 NHS Band 1 Urgent claims per practitioner
Median antibiotic items per 100 NHS Band 1 Urgent claims was 88.9 (IQR 46.2 - 184.5). The range was 0.8 - 85,500.

Clinicians ≥90th percentile prescribed more antibiotic items (p<0.001) but undertook fewer courses of NHS treatment (p<0.001) than those below. Outlying practitioners completed proportionately more Band 1 (p<0.001), and fewer Band 1 Urgent (p<0.001) and Band 3 treatments (p=0.011) than non-outliers (Figures 3a,b).

Figure 3 – Comparisons between practitioners on or above and below 90th percentile for antibiotic items dispensed per 100 NHS Band 1 Urgent Claims 2014/15
a) Median number of antibiotic items per 100 NHS Band 1 Urgent claims, median number of antibiotic items per annum, and median number of NHS courses of treatment
b) Band 1,2,3 and 1 (Urgent) claims as a proportion of total courses of treatment

Proportion of 'second-line' antibiotic items (azithromycin, clindamycin, co-amoxiclav, and clarithromycin) of total antibiotic items
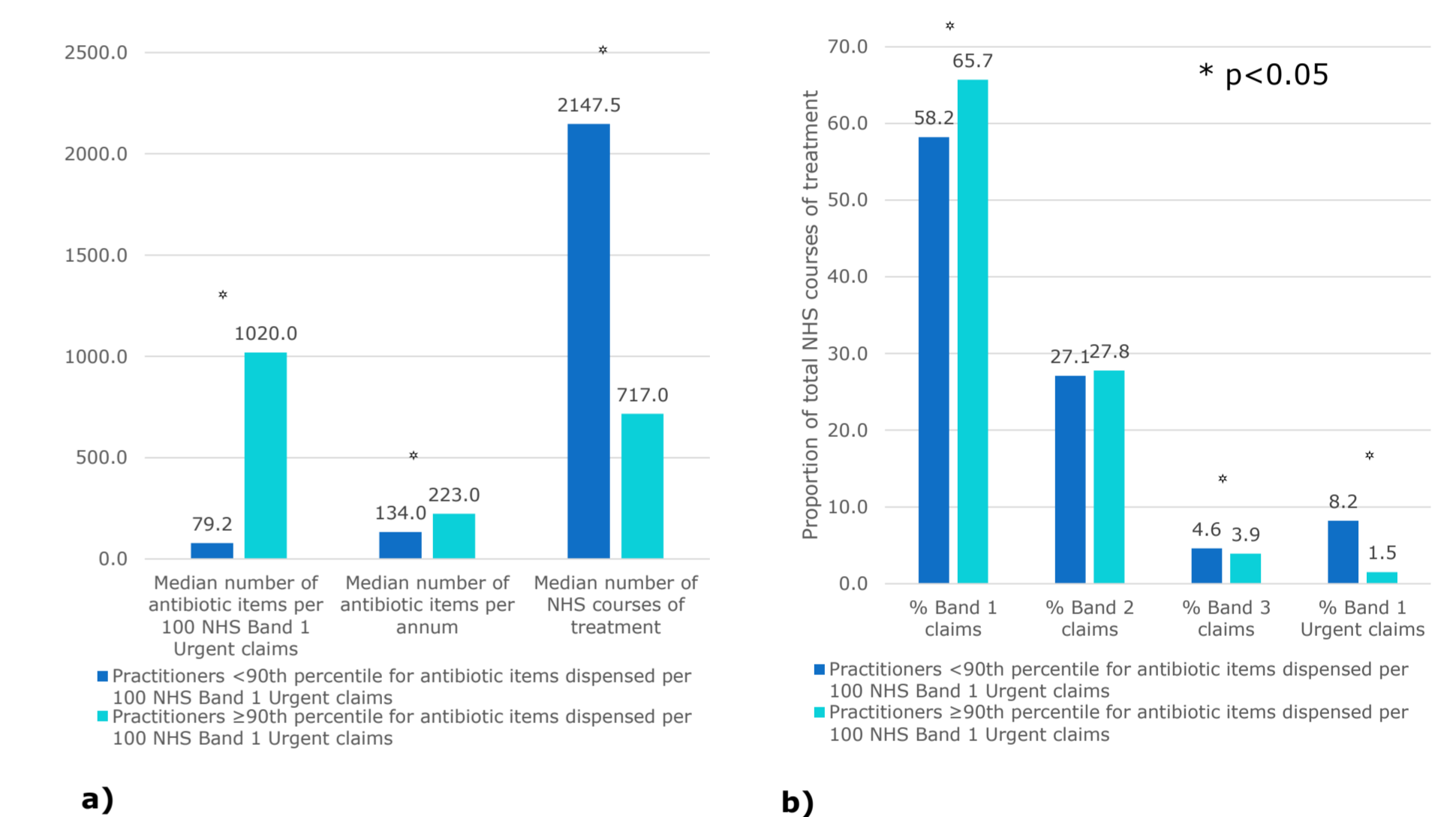For 90% of practitioners, second line agents accounted for ≤3% of all antibiotic items prescribed. However, there were 16 practitioners for whom second line agents were >15% of the total items. In total, 81% of second line agents were prescribed by 10% of practitioners.

Proportion of antibiotic agents not recommended for use by clinical guidelines (cefalexin, cefradine, oxytetracycline, and tetracycline) of total antibiotic items
For 90% of practitioners. non-recommended agents accounted for <1% of total items prescribed. There were 10 practitioners for whom non-recommended items made up >10% of total items. In total, 86% of second line agents were prescribed by 5% of practitioners.

Number of antibiotics items dispensed per dental practice, Health Board, and by WIMD 2014 quintile
Almost a third (32.4%) of dentists undertook dental activity at more than one practice during 2014/15. However, during preliminary analysis of the antibiotic prescribing data it was observed that each clinician was associated with only one practice address. Therefore, whilst it was possible to undertake practitioner-level analysis, it is not currently possible to analyse prescribing at dental practice- or Health Board-level, or to adjust prescribing for local deprivation (WIMD 2014 quintile).

EXAMPLES OF POTENTIAL FEEDBACK FORMATS
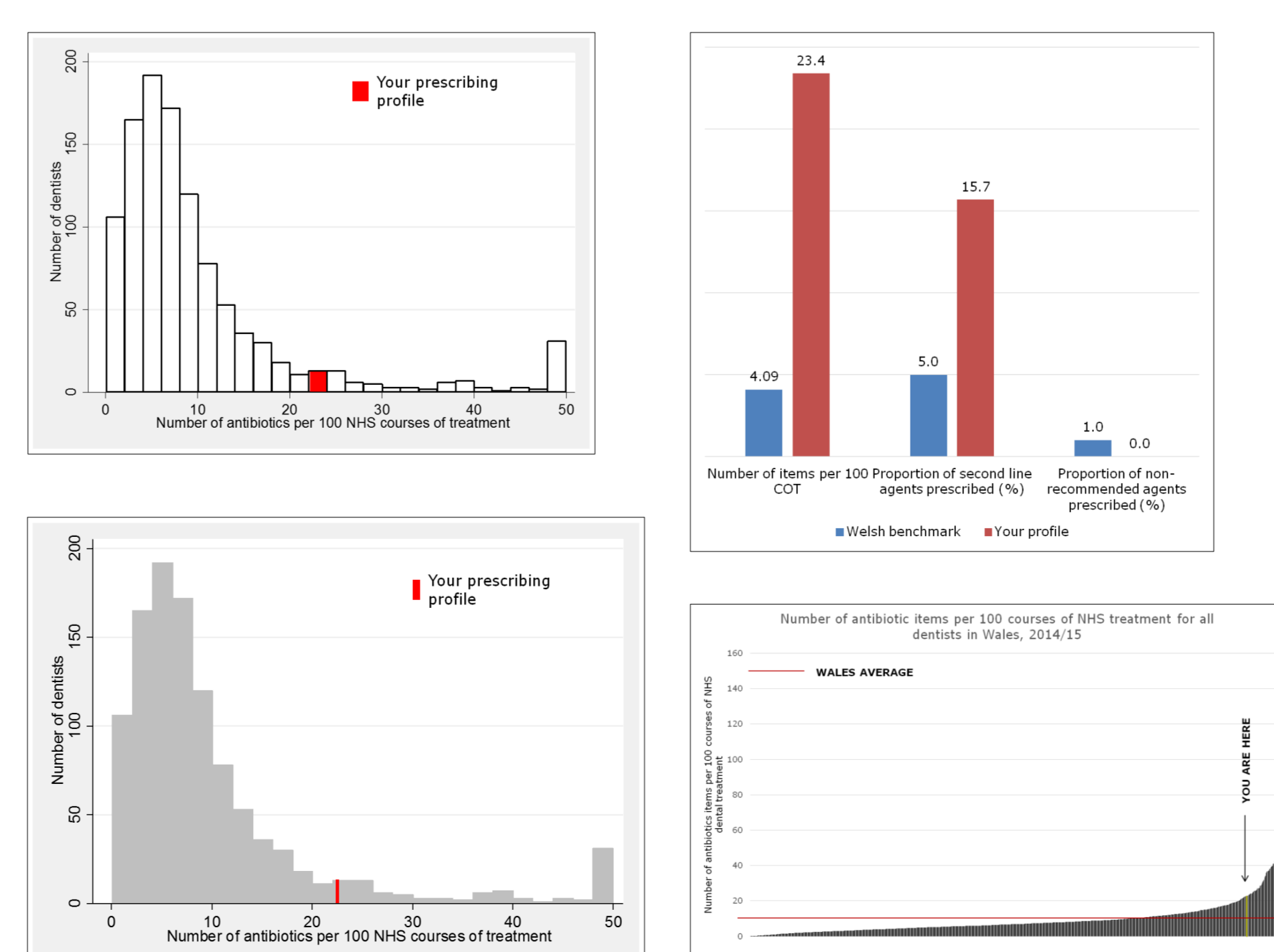
CONCLUSIONS

With some improvements in existing data collection systems, it will be possible to produce accurate personalised feedback profiles for GDPs working in NHS Wales.

However, in order to maximise benefits of developing a system of producing practitioner- and practice-level prescribing profiles, further work is needed to explore the attitudes of practitioners and Health Boards towards the outcome measures described within this presentation, and to explore reasons why certain practitioners may be identified as outliers.

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